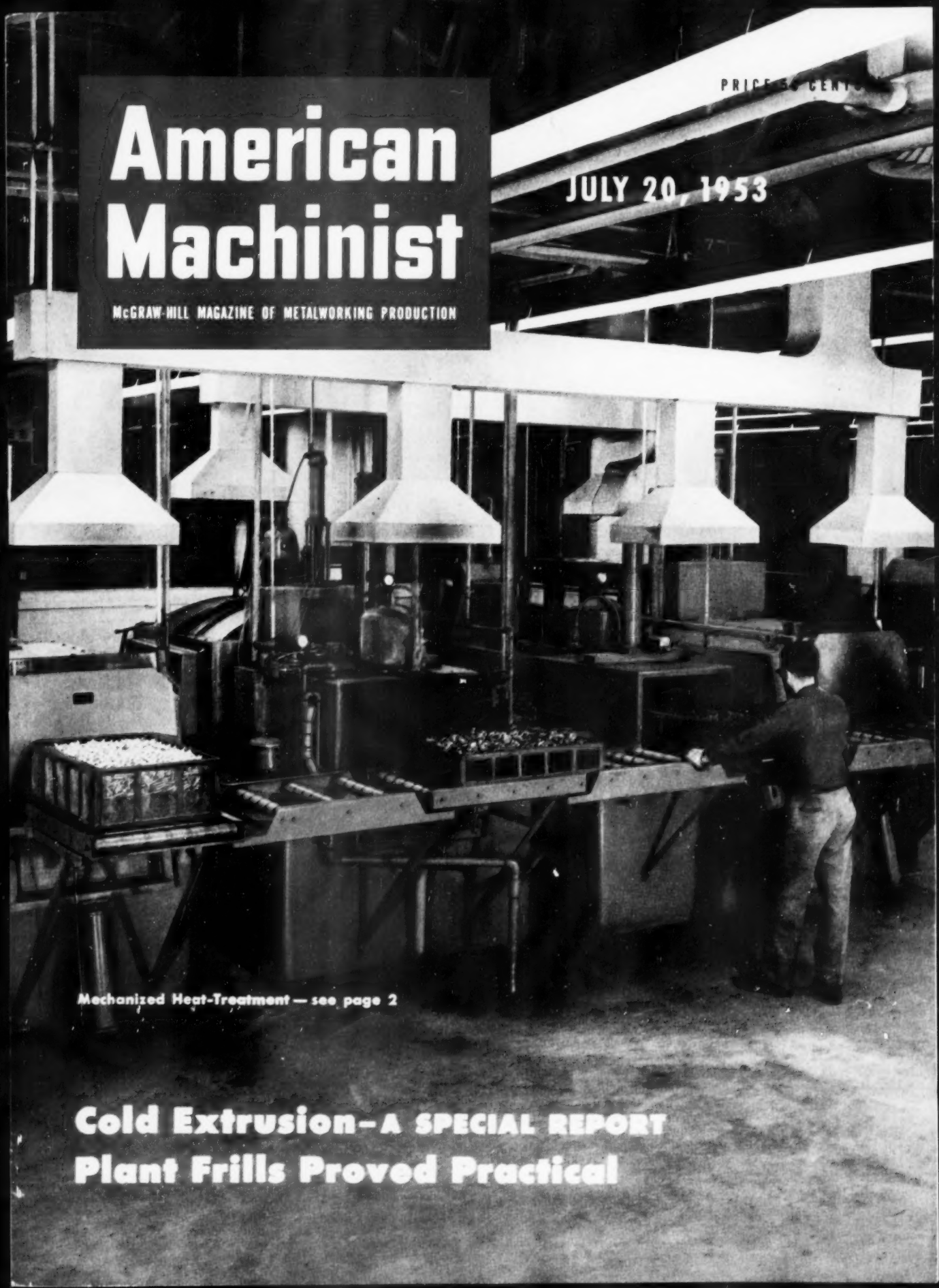


American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

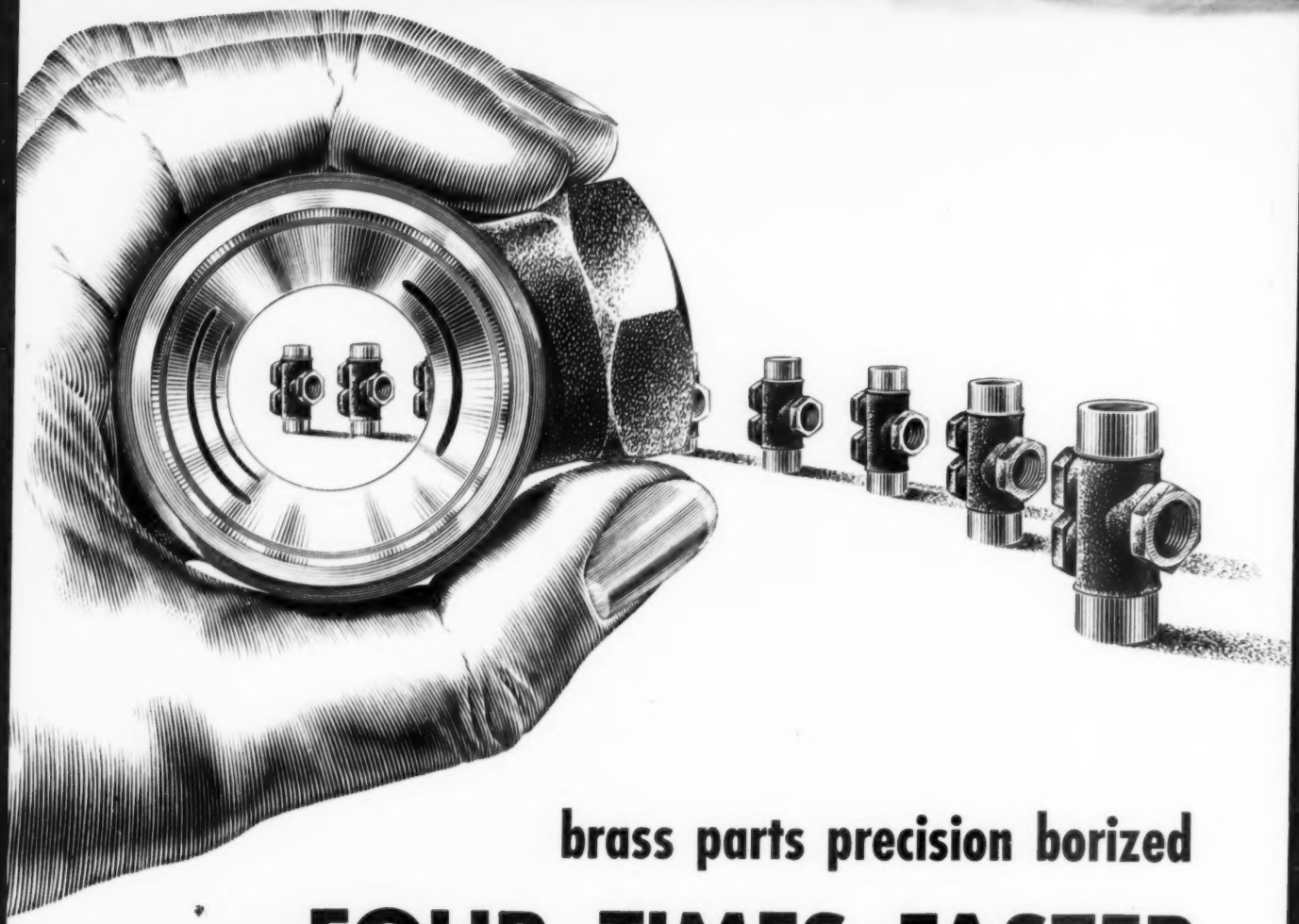
PRICE 50 CENTS

JULY 20, 1953

Mechanized Heat-Treatment — see page 2

Cold Extrusion—A SPECIAL REPORT

Plant Frills Proved Practical



brass parts precision borized

FOUR TIMES FASTER

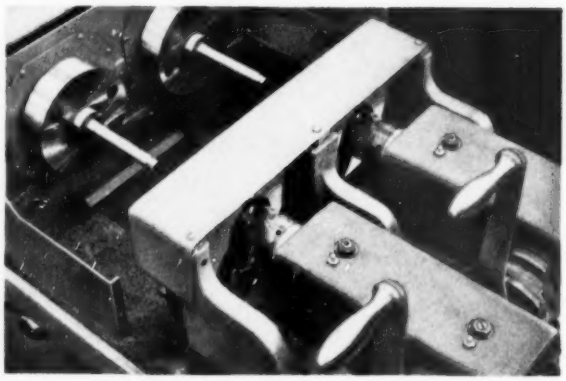
. . . with higher accuracy and better finish, too!

● No wonder this Heald customer is pleased.

Compared to the method previously used, his new Bore-Matic has multiplied air-valve production *four times!*

This one machine, a Model 124 Bore-Matic, finishes 15 different sizes and types of valve bodies. What's more, borizing of the rough-reamed parts produces a bore that's straight, round and within .0002" for size. Scrap losses have dropped to the vanishing point. And the new machine is far easier to operate, requiring less operator training.

Remember—when it comes to precision finishing, it pays to come to Heald.



Internal and Rotary Surface Grinding Machines and Bore-Matics

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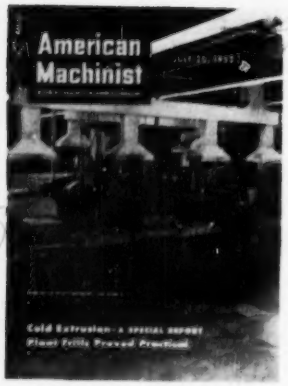


chips

MODERN HEAT . . . Our cover Flexichrome shows a modern heat-treating setup for handling job lots. The furnace at left is a 300-lb-per-hr draw furnace with controlled atmosphere supplied by endothermic generators behind it. Here brass fuze bodies are being treated. Next to it is a 250-lb-per-hr unit which combines heat-treat and quench or cooling, separated by an airdraulic elevating door. Like the unit at left, it cycles automatically . . . Third in the line is an automatic single-stage, circulating washer with elevator for the load and a built-in skin-off. At right is a draw-quench furnace which produces a blue finish. These units are handling steel stampings.

The operator is inexperienced; his work is charted so all he does is turn valves, set timers, and route tote boxes. All units are made by Ipsen Furnace and are in the Ipsenlab in Rockford, Ill.

FRILLS . . . Recently, we visited the new plant of Duncan Electric at Lafayette, Ind, and were duly impressed by the unusual number of tricky ideas. We got pictures and data, to show what less than $100 an employee can do in providing additions to working pleasure that cut fatigue, improve production, and reduce recruiting problems.

CONTROVERSIES . . . It's pretty hot weather for arguments, but we thought we'd better rush you a couple of controversial yarns. One is a discussion on shaving dies from a German reader who knows his stuff, and points out differences in German and American practice . . . Then Leo St Clair asks if coolant for carbide cutting is really necessary, citing a case study he has made. When he cut out coolant on a lathe job, he increased production 140%.

VEST POCKET . . . Associate Editor Linsley visited Hamilton Watch Co a while back, was very much intrigued by that company's solution to the problem of obtaining small quantities of special alloy steel for watch springs. The answer was a miniature steel mill, which he thought you'd want to see. Thus two pages of pictures.

AFT . . . Ryan Aeronautical makes aft frames for aircraft, involving welding, gap turning, cone rolling, and drilling. The stock is stainless and fair accuracy is required, so the job is no cinch.

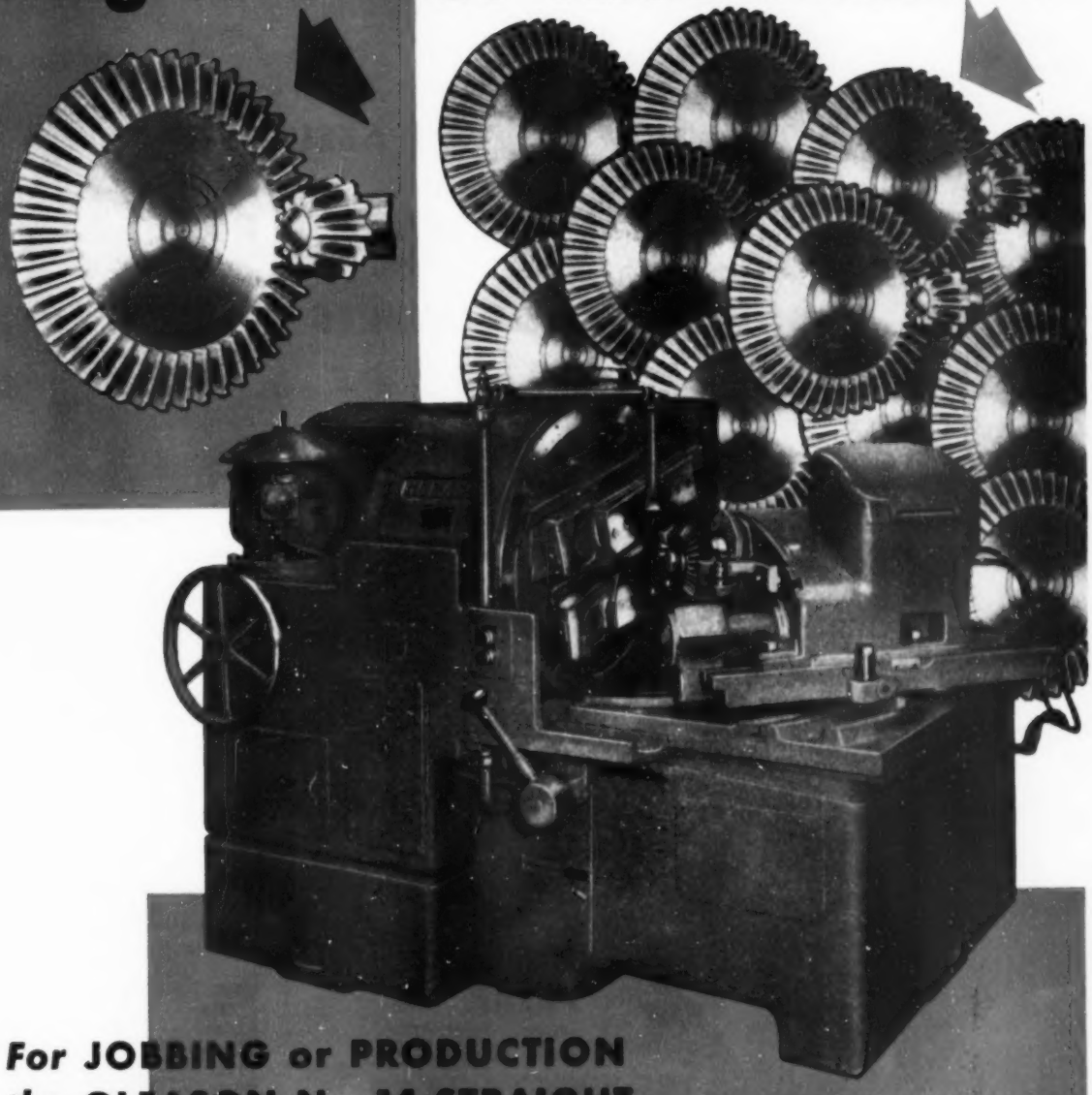
EXTRUDING STEEL . . . When you make millions of a given part, you'd better study constantly the alternative methods of manufacture. Savings of material through using cold-forming processes—extrusion, cold heading, swaging, coining—is the main reason why cold-working of metals by compression has taken over in manufacture of several Delco-Remy parts, large and small. Savings have been large enough, because of volume, to amortize the investment for equipment in relatively short periods. We tell all in our current 8-page Special Report.

TOOL MAINTENANCE . . . Diamond-wheel conservation, including correct cutting fluids for grinding tungsten-carbide tools, is the subject of a 3-page roundup from Carborundum. There's also the detail on where to use silicon-carbide wheels when diamonds are short.

COMING . . . Aug 3 *AM* will have a 16-page Special Report on how a plant was revamped, plus articles on solving odd measuring problems, making of torsion-bar springs, an ingenious toolholder, and wire wrapping as worked out by Bell Labs. There's also the first of a noteworthy series on drawing-die design by Stanley Cope.

TOOLROOM GRINDING SPECIALIST . . . John W Ripple, Jr, has been with The Carborundum Company, Niagara Falls, for 18 years. From 1935 to 1941, he was in the Abrasive Grain Department; and since then a sales engineer. In '41, he won the Frank J Tone award for outstanding educational achievement during the year. Mr Ripple is a specialist in toolroom applications including the grinding of cemented carbides. In this issue, he presents a roundup of experience in the latter field.

Single Lots or Thousands...



For JOBBING or PRODUCTION
the GLEASON No. 14 STRAIGHT
BEVEL GENERATOR LEADS THE WAY

It is universal within its range . . . is easily set up and changed from one job to another . . . equipped with double track cam for roughing and finishing . . . handles gears up to 24" pitch diameter in large or small quantities.

Write for leaflet and see how the No. 14 Straight Bevel Generator will fit your requirements.

GLEASON

GLEASON WORKS
BUILDERS OF BEVEL GEAR MACHINERY FOR OVER 85 YEARS
1000 UNIVERSITY AVE. · ROCHESTER 3, NEW YORK

GIVING THE OPERATOR AN ASSIST

. . . AND PRODUCTION A BOOST . . .

WITH AUTOMATIC FEATURES

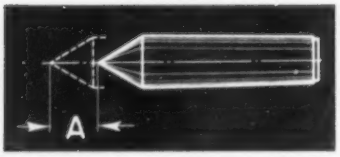
Goal for low-cost operation of metalworking shops . . . when you increase production, reduce worker fatigue. How this desirable result was attained for a production centertype grinding operation is illustrated here—a CINCINNATI 10" x 36" Plain Hydraulic Grinder equipped with automatic features. ¶ First, there's the *automatic infeed attachment*, for infeed grinding operations. It reduces fatigue and aids production by doing several things for the operator: rapid advance wheel to work, grind, spark-out to size, rapid retract wheelhead. Secondly, the *hydraulic footstock* advances and retracts the work center automatically, relieving the operator of this onerous chore twice for each part ground. *Automatic grinding wheel spindle reciprocating attachment* improves finish on the work without undue operator attention.

1 **AUTOMATIC INFEED**

X = Stock removal, adjustable from 0 to .030".

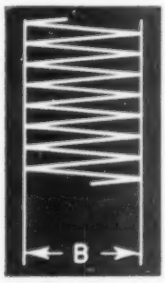
2 **HYDRAULIC FOOTSTOCK**

A = Automatic advance and retraction of footstock spindle.



3 **AUTOMATIC SPINDLE RECIPROCATION**

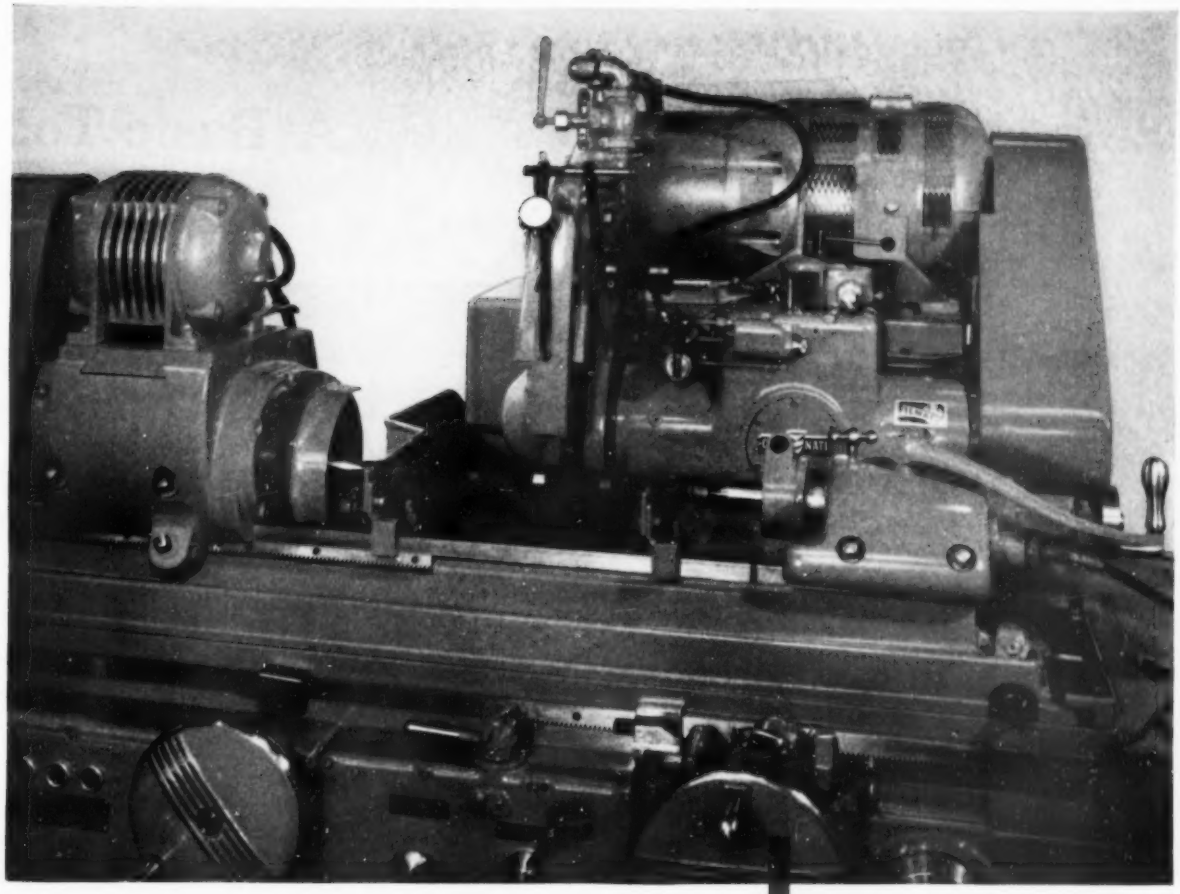
B = Stroke, adjustable from 1/32" to 3/16".



CINCINNATI

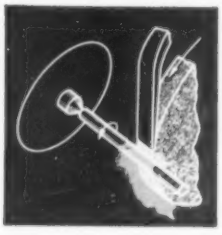
CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

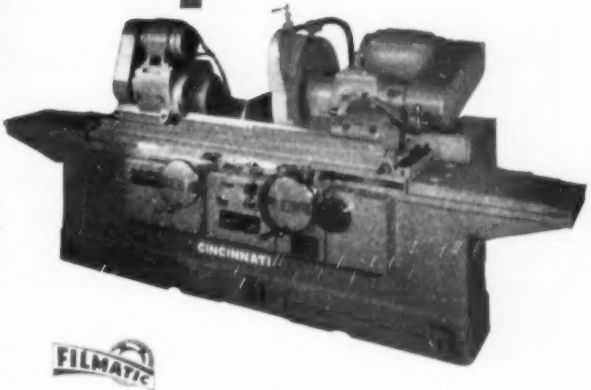


4 **AUTOMATIC COOLANT AND HEADSTOCK CONTROL**

Work rotation and coolant automatically start and stop. Standard feature.



Drawing of camshaft ground on the CINCINNATI FILMATIC 10" Plain Hydraulic Grinder illustrated here. Heavy line indicates ground surface.



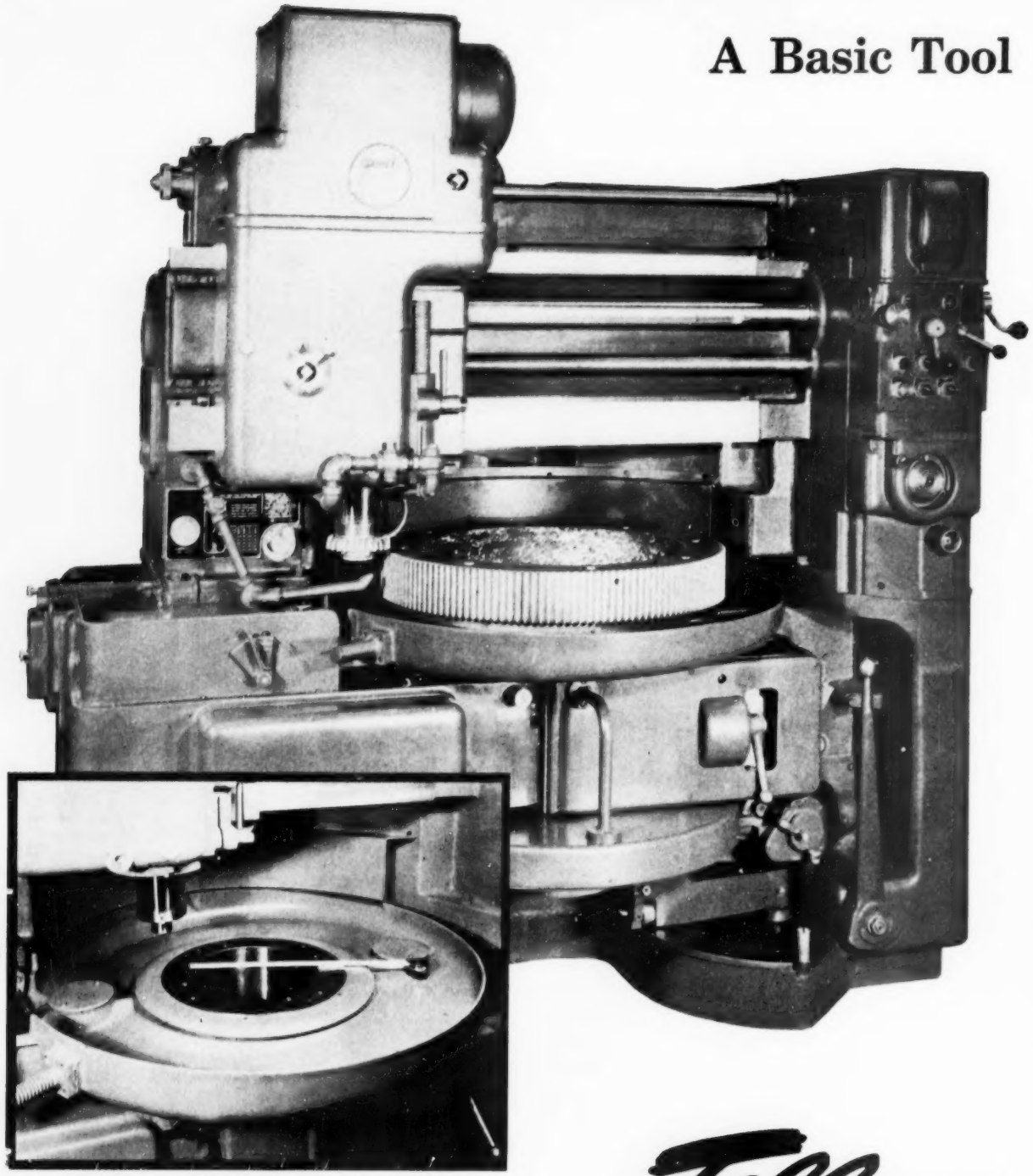
FILMATIC

CINCINNATI FILMATIC 10" x 36" Plain Hydraulic Grinding Machine. Catalog No. G-603.

Of course, standard CINCINNATI Plain Hydraulic Grinders are the essence of easy operation. Controls are grouped for maximum convenience; headstock and coolant automatically start and stop with the table or cross feed traverse; the grinding wheel spindle bearings —CINCINNATI'S exclusive FILMATIC type—run for years without adjustment. ¶ For new production requirements or replacing old equipment, you can't beat a CINCINNATI. You will find brief data in Sweet's Machine Tool Catalog. Complete information may be obtained by writing for our publication No. G-603.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

A Basic Tool



Great flexibility in work handling is possible with the new 36Z-1 Type Gear Shaper. Note the 12″ diameter straight hole in the work-spindle.

Fellows

The FELLOWS METHOD
...in action!

for

HEAVY-DUTY Gear Cutting

- *Standard 36-Type* Fellows Gear Shaper for spur or helical gears to 6" face width in all sizes up to 36" pitch diameter—external or internal. Herringbone gears, cams, ratchet teeth, splines, special contours . . . all rough and finish cut on one set-up.

- *36Z-1 Type* (with 12" hole in work spindle) for cutting large shank gears, aircraft crankshaft splines, variable pitch propeller blade hub splines, etc.

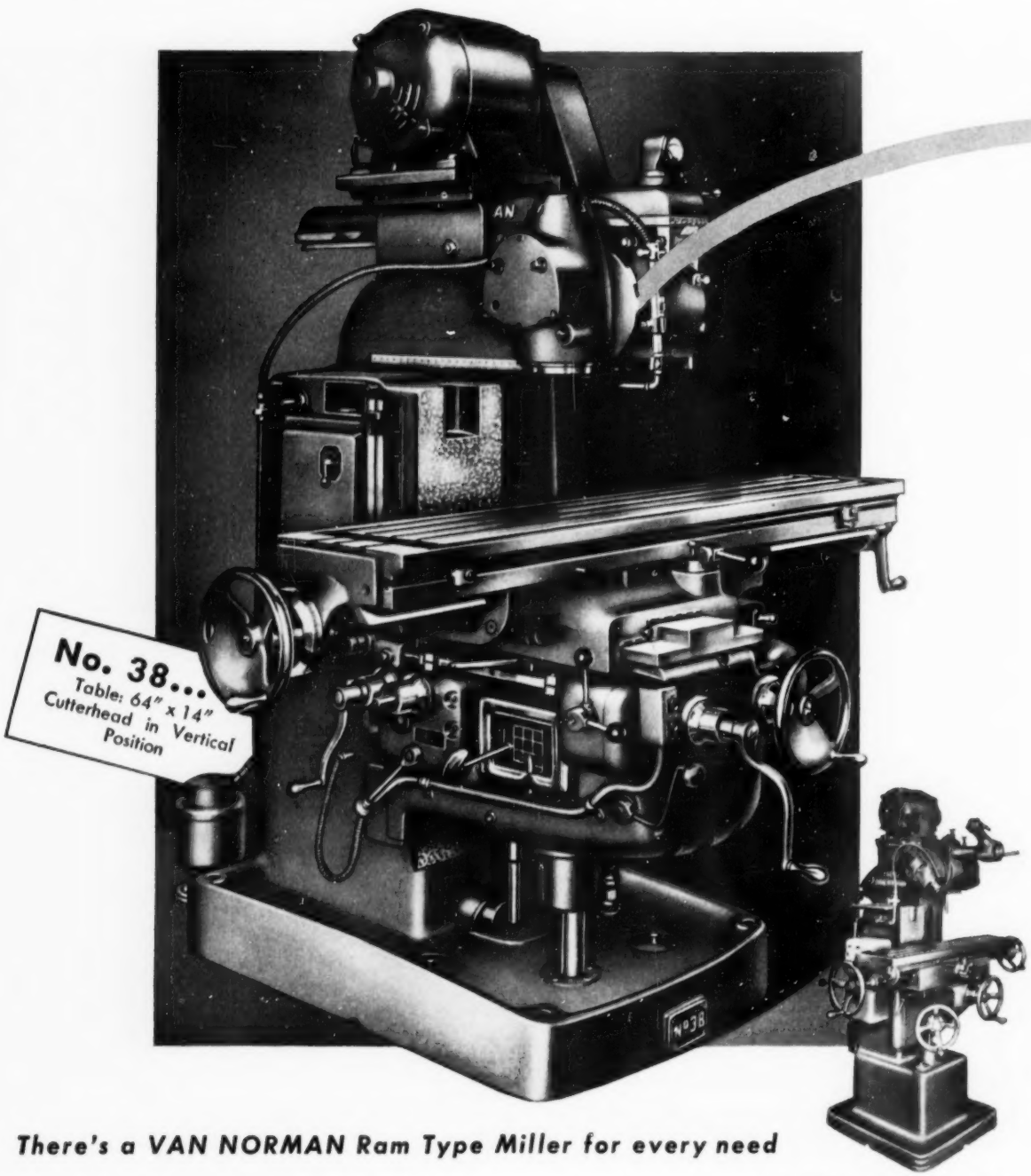
Cutting coarse pitch pinion on 36Z-1 Type Gear Shaper at the Illinois Gear & Machine Company, Chicago, Illinois.

Designed for high-production with maximum flexibility, the 36-Type Gear Shaper is the all-purpose machine for production or jobbing shop gear-cutting. Set-up time is low. Operation is easy . . . quick change-over from heavy-feed roughing to fine-feed finishing cuts by shifting a lever. Choice of 12 cutter-spindle speeds, quickly shifted through a selecting dial. Machine rigidity and power make it possible to hold close limits while taking heavy cuts. The versatile 36-Type can lower your gear production costs. Write the nearest Fellows Office for details.

GEAR SHAPER COMPANY

Head Office & Export Department: 78 River Street, Springfield, Vermont.
Branch Offices: 323 Fisher Building, Detroit 2 • 5835 West North Ave., Chicago 39.
2206 Empire State Building, New York 1.

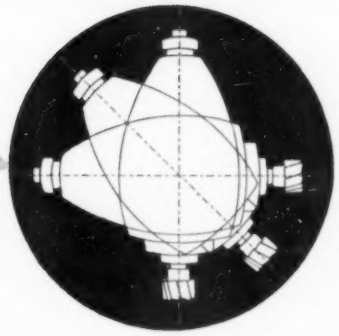
VAN NORMAN
RAM TYPE MILLERS



There's a VAN NORMAN Ram Type Miller for every need

No. 12 Table: 37½" x 9⅛"
Cutterhead in Angular Position

Eliminate Idle Machine Time up to 50%



The adjustable cutterhead meets all milling requirements... Horizontal, Angular, Vertical... with ONE Miller

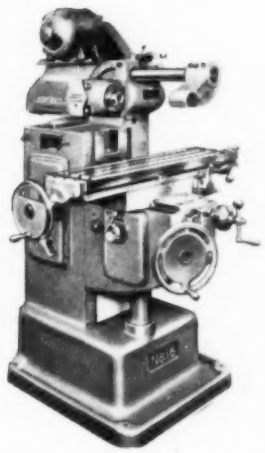
The versatility of the Van Norman ram-type milling machines provides a greater work range than available on single purpose machines.

The adjustable cutterhead in combination with the movable ram enables you to perform conventional horizontal and vertical as well as angular milling. This feature reduces work setups and reduces idle machine and operator time by as much as 50% . . . increases productivity proportionately. In addition, front and rear directional controls of power feeds simplify operations . . . cut operator fatigue.

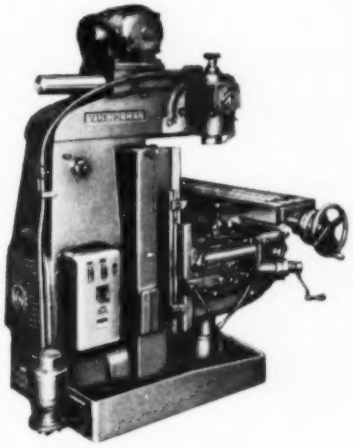
The Van Norman ram-type millers are ideal for use in the tool room, job shop, pattern shop, experimental laboratory, die and mold shop and for production work.

Because Van Norman Ram Type Millers enable you to meet all milling jobs, they keep operators and machines working. They cut costs, improve accuracy and increase production.

VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS, U.S.A.



No. 16 Table: 37" x 9½"
Cutterhead in Horizontal Position



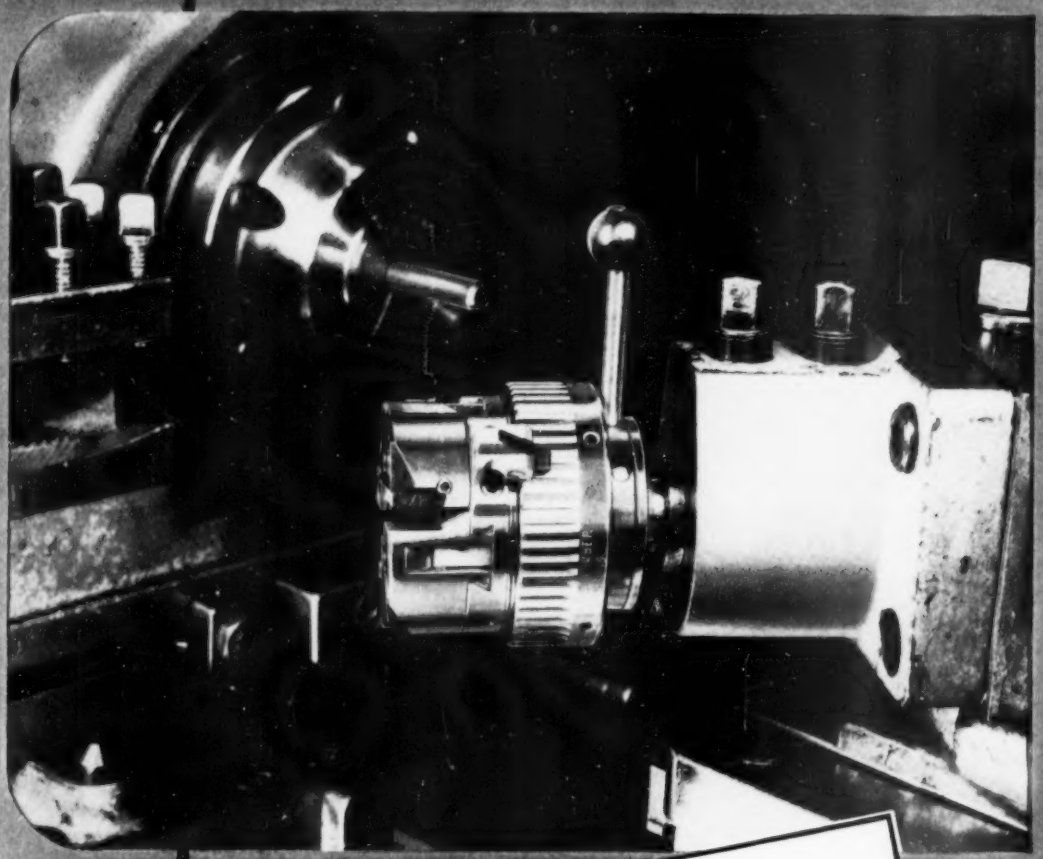
No. 22L Table: 45" x 10"
Cutterhead in Vertical Position

No. 26 Table: 58" x 13"
Cutterhead in Angular Position

For Precision Threading on TURRET LATHES

The IMPROVED

• POSITIVE
• MORE RIGID



LANDIS Machine COMPANY

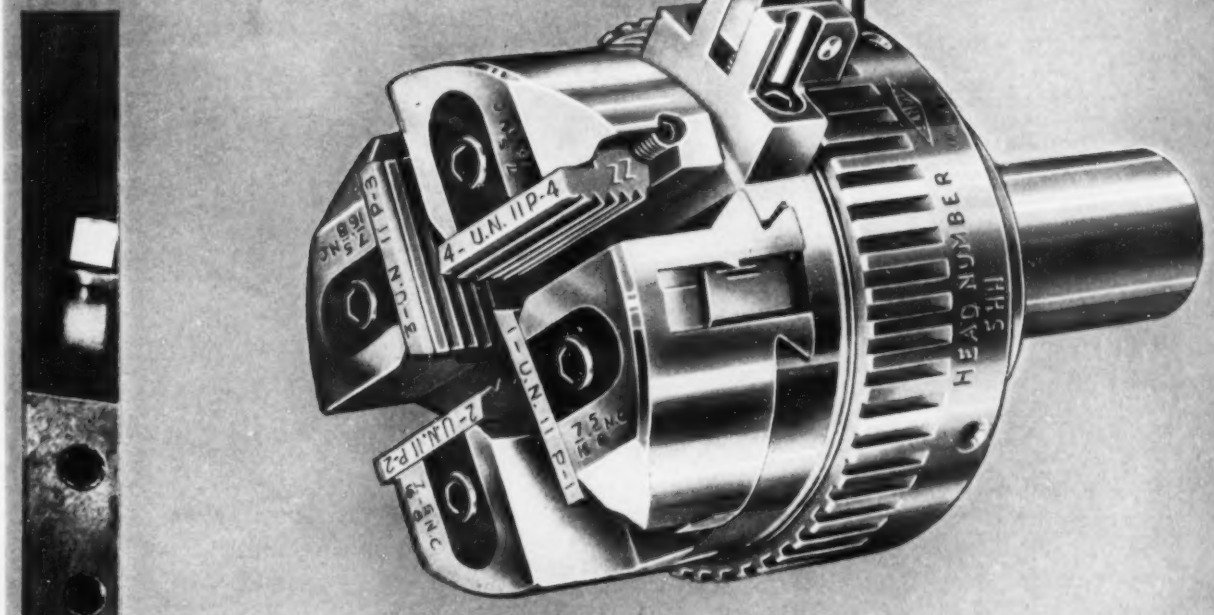
WAYNESBORO, PENNSYLVANIA, U. S. A.

50th ANNIVERSARY

THE WORLD'S LARGEST

5/8" LANDMATIC HEAD

LOCKING ACTION CONSTRUCTION



AN improved *LANDMATIC* Hardened and Ground threading head has been designed for use on turret lathes, hand-operated screw machines, and automatic screw machines employing a stationary head. The 5HH *LANDMATIC* is a stationary self-opening head, and will produce threads ranging from ¼" to ⅝" in diameter. Its construction features two important improvements in design—a positive locking action, and greater head strength.

The positive locking action is provided by a new size-adjustment mechanism. A pivoted latch is held in engagement with notches on the adjustment ring by spring tension. A movement of one notch makes a corresponding adjustment of .001" on the pitch diameter of the workpiece.

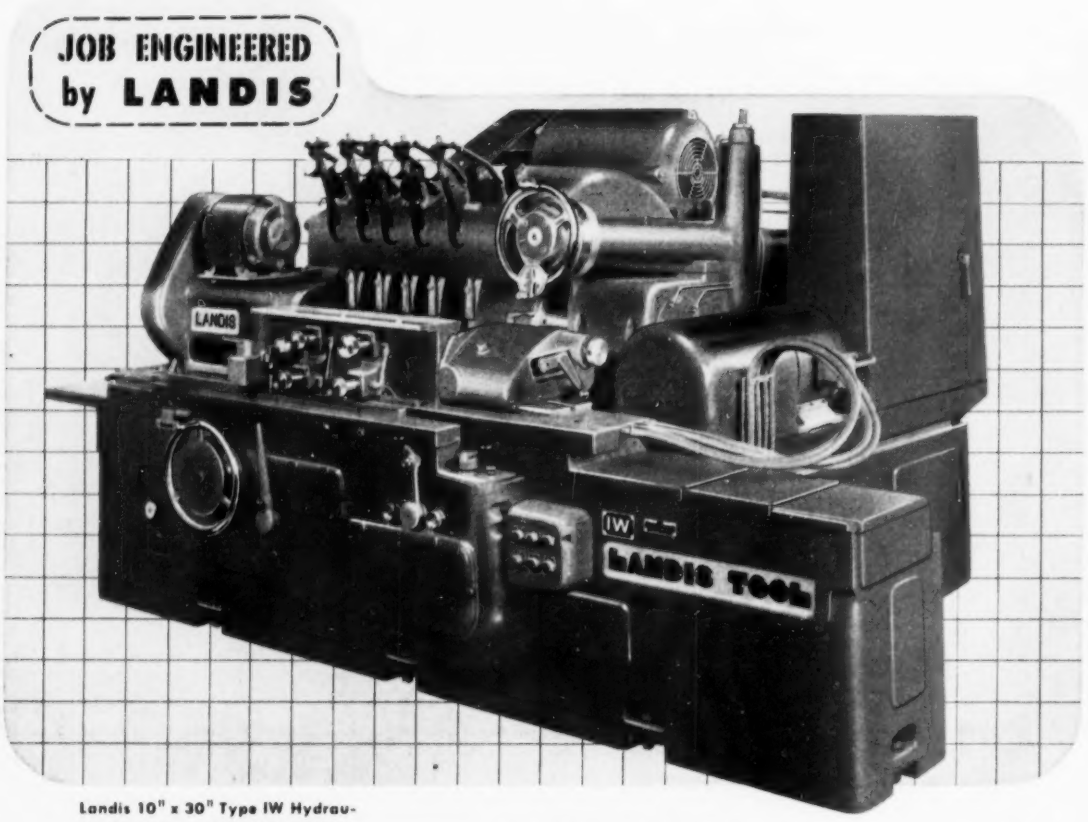
The greater overall strength of this die head results from the increased thickness of the head body and its various parts. The new design allows this small die head to easily withstand the extreme stresses imposed when threading special alloy steels.

The 5HH *LANDMATIC* Head has a notably small number of working parts. All parts are made of special alloy steel, and are hardened and precision ground. Left-hand threads may be cut by using left-hand chaser holders and regrinding the same set of chasers. More information available on request.

EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT

How LANDIS JOB ENGINEERING cuts grinding costs...

Grind Up To 10 Diameters At One Time On Multiple Wheel Grinders



Landis 10" x 30" Type IW Hydraulic Grinder for grinding multiple diameters in one operation—straight, tapered, shaped or in combinations. IW's are made in 2 sizes.

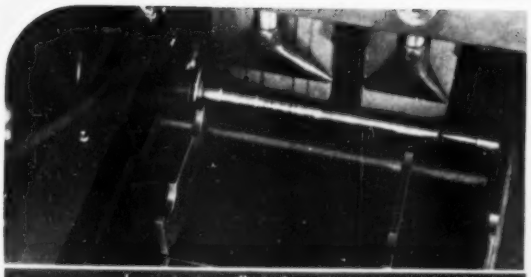
The Multiple Wheel Grinder is a good example of JOB ENGINEERING by LANDIS. This grinding method was developed to solve a specific production and quality control problem. Advanced design makes it possible to grind a great variety of parts. The result is a machine that pays for itself fast . . . that brings users higher returns than was ever thought possible.

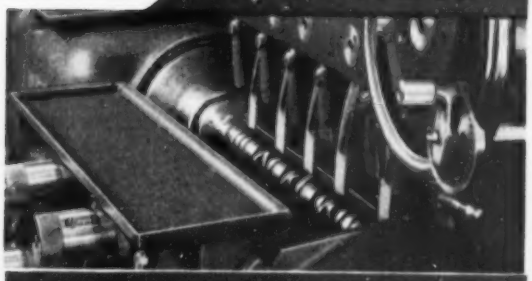
Want an idea on how LANDIS JOB ENGINEERING can help you cut costs of your grinding operations? Send us your part prints and production requirements. We'll give you tooling and production estimates at no obligation.

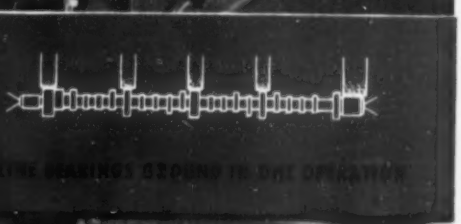
LANDIS

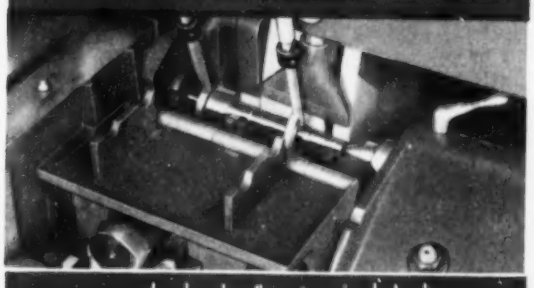
precision grinders

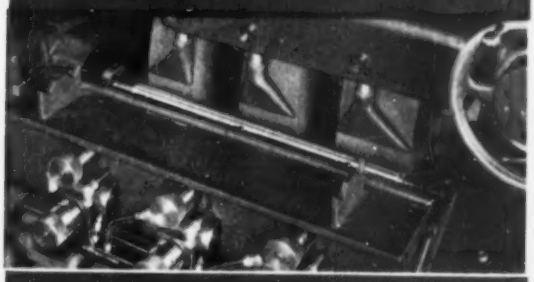
JOB ENGINEERED
by LANDIS

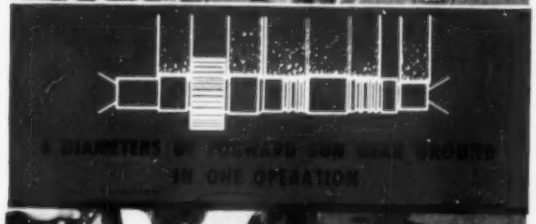


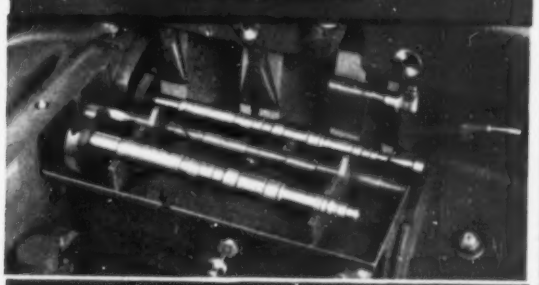


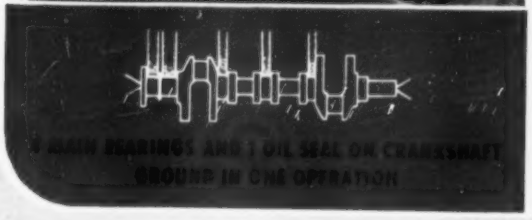


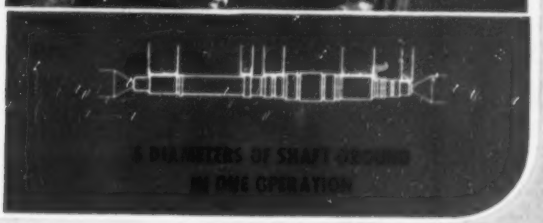




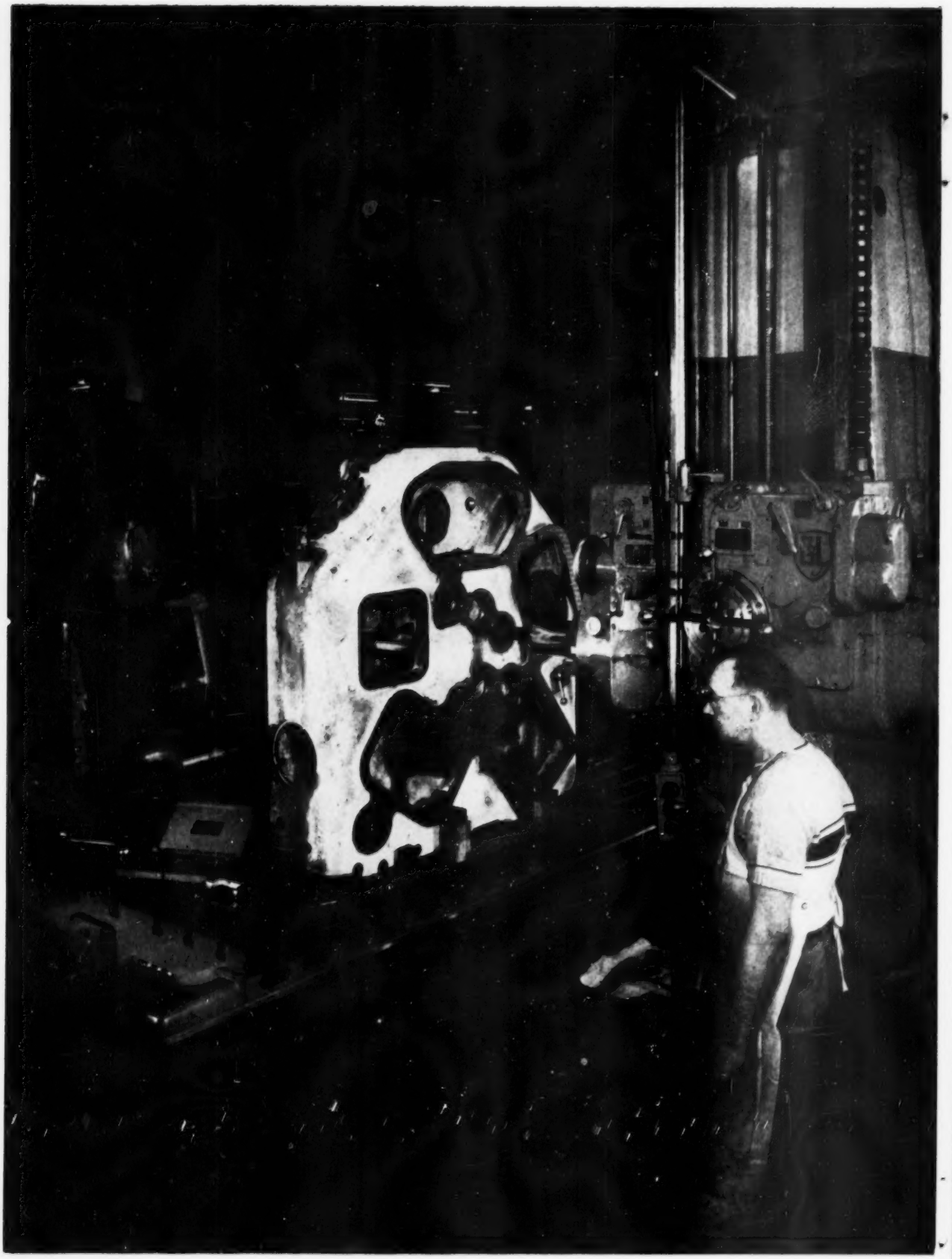








LANDIS TOOL COMPANY • WAYNESBORO, PENNSYLVANIA, U. S. A.



Bullseye!...

on the mark within .0002"

Here's precision, speed and versatility to perform boring, drilling and milling operations with equally high efficiency. Here's capacity to handle large or small work, simple or complex set-ups, long or short runs. Here's the 350-T, another superlative G&L Horizontal Boring, Drilling and Milling Machine

As one enthusiastic production engineer put it, "We've found our G&L horizontal bar furnishes faster cutting speeds, heavier cuts, better finishes, greater efficiency and improved operating economy. Its 45 speeds and 36 feeds are so well designed that the machine provides excellent performance for an overall range of milling, drilling and boring practices."

Here briefly are some of the features of this 25 hp, 5" spindle, table-type machine — choice of three basic arrangements of table and saddle; hardened, heavy-duty ways on bed and saddle; rapid, easy speed selection; bed lengths from 96" to 144"; column heights from 48" to 72"; and cross travel ranging from 72" to 120" with saddle supports.

What's more, these versatile machines can be equipped with the G&L Automatic Electric Positioning Device. This unit eliminates many time-consuming hours for final hand adjustments for locating work. That's because it automatically controls table and headstock movements to precise, pre-determined settings.

For complete information, see your G&L representative or write ———

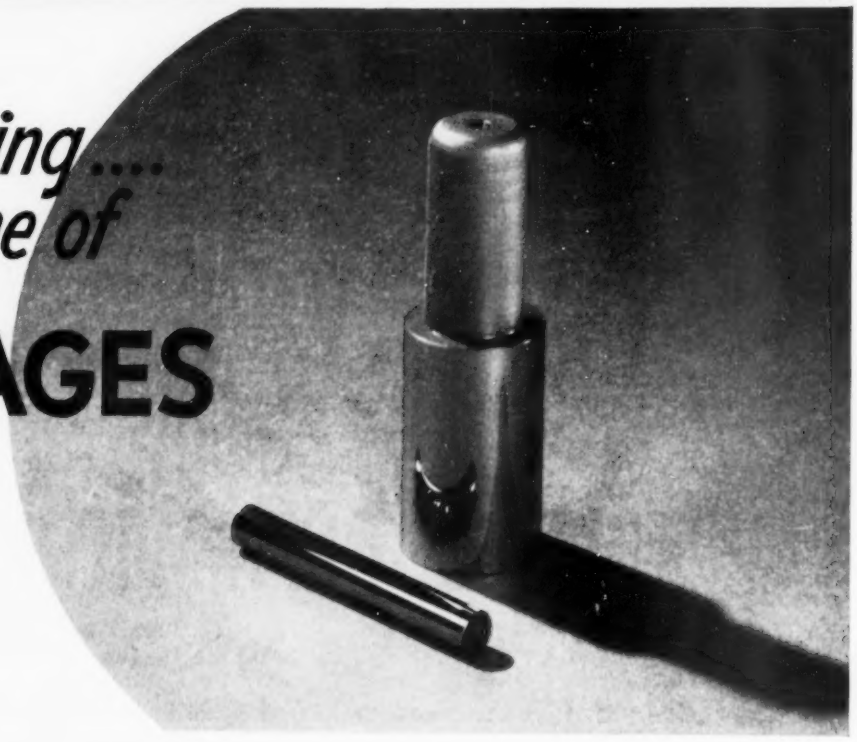
GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Open Side Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

Photo courtesy of Greenlee Bros. & Co.

Announcing.... a New Line of

VK GAGES



CHROME CARBIDE TAPER INSERT PLUG GAGES .500" to 1.510"

Lighter and Longer-Lived

In addition to its regular line of tungsten carbide wire type plug gages from .016" to .500" diameter, The Van Keuren Company now offers a new line of *Chrome Carbide Taper Insert Plug Gages* in the range from .500" to 1.510" diameter.

Made of Carboloy chrome carbide, grade ♯608*, these gages offer huge savings in cost per hole gaged. Wearing qualities of the new chrome carbide material are comparable with those of tungsten carbide. This material provides the additional advantages of being much lighter and of having a coefficient of expansion close to that of steel. The finish on VK Chrome Carbide Gages will average .5 RMS or better.

Van Keuren Chrome Carbide Taper Insert Plug Gages are available in Class Y, X, XX accuracies at moderate prices and on a reasonable delivery basis.

Send for a copy of the 220-page Van Keuren Catalog and Handbook No. 35 containing valuable technical and engineering information on measuring problems and methods. Address: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

*Trademark of Carboloy Dept. of General Electric Co.

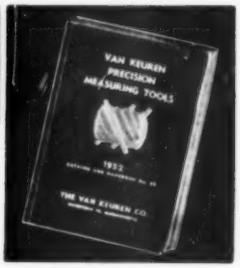
VK

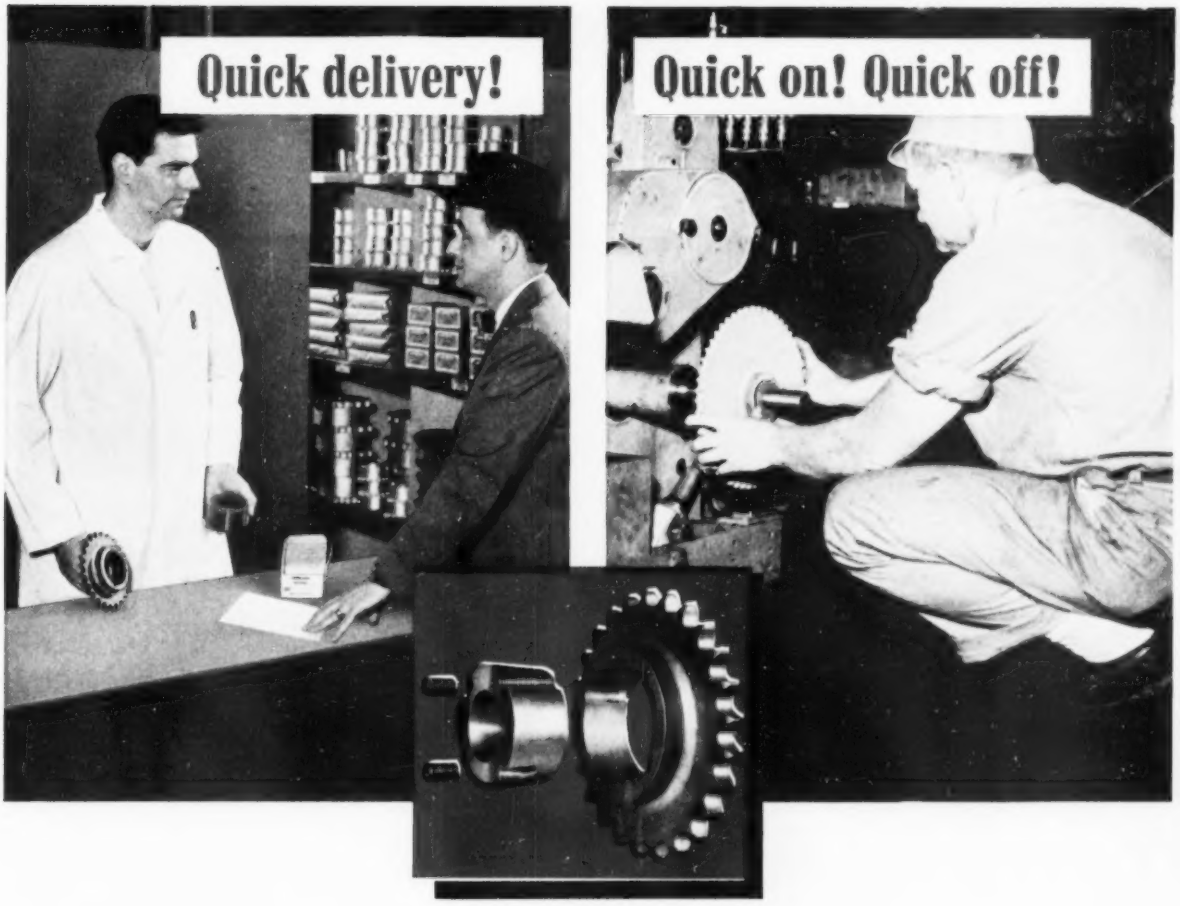
34th YEAR

THE *Van Keuren* CO.

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires



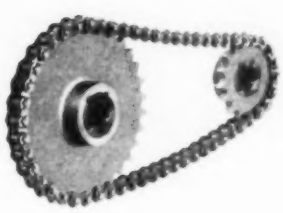


Link-Belt roller chain sprockets with taper lock bushings

HERE'S great news for users of roller chain drives! With the new Link-Belt taper lock sprocket, you don't have to fit the sprocket to the shaft. These sprockets with their taper lock bushings give you the equivalent of a shrink-fit on all standard shaft sizes.

Installation and removal are fast, simple. Set screws force and hold bushing in tapered bore of sprocket, *clamp* it tightly onto shaft. The *full length* of the bushing supports the sprocket on the shaft. Turning set screws in removal holes quickly releases it from shaft.

What's more, it's no longer necessary to wait while wheels are rebored. You can pick these sprockets right off the shelf at your nearby Link-Belt distributor or factory branch store. Available now are sizes for ½, ⅜, ¾, 1 and 1¼-in., single-width chains with other sizes to be announced. Ask for Bulletin 2449.



AN IDEAL COMBINATION:
LINK-BELT PRECISION STEEL ROLLER CHAIN & LINK-BELT SPROCKETS

LINK-BELT

ROLLER CHAIN AND SPROCKETS

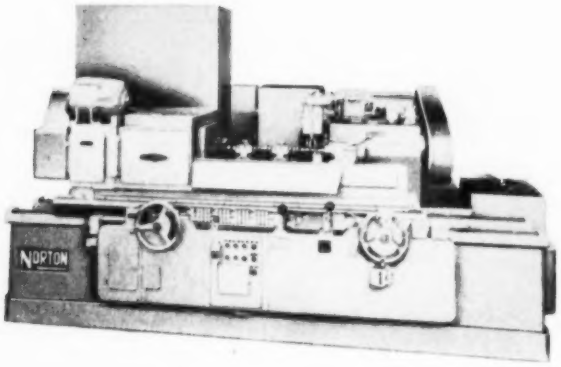
LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,291

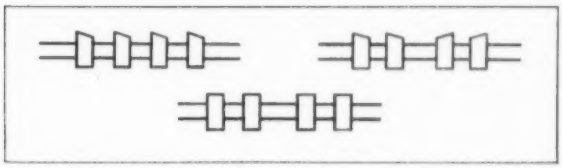
HERE'S HOW YOU CAN ADD THE

Thanks to the many automatic features of the No. 2 CAM-O-MATIC Grinder, this operator's work is reduced to loading and unloading. He can now tend two or more machines — another big advantage of this Norton-engineered "Touch of Gold."

"TOUCH OF GOLD"

TO YOUR CAMSHAFT GRINDING





The Norton No. 2 CAM-O-MATIC Grinder brings you time-and-money-saving advantages found in no other grinding machine.

In the Norton No. 2 CAM-O-MATIC Grinder you get an ahead-of-the-parade grinding machine that has expert operating skill built right into it. That's your Norton-developed "Touch of Gold" that turns out better camshafts in less time and with less labor . . . adding to product-value and cutting your costs every step of the way.

Speed Is ALWAYS Right — Automatically

One big advantage is the automatically compensating work speed arrangement. Starting with the ideal speed for rapid stock removal, this changes gradually to exactly the right speed for fine finishing and contour accuracy — as each cam is being ground. Eliminating guesswork and manual adjustment, this exclusive Norton improvement steps up both the quality and rate of your production.

Your Choice of Tapers

The swiveling wheel slide — a Norton patent — permits grinding cam tapers in one direction (standard equipment) or tapers in opposite directions on the same shaft (an optional extra). Both arrangements permit straight-face grinding by a simple adjustment. Both grind tapers fast and accurately, while increasing the versatility and capacity of your camshaft operations.

No Lost Motion

The entire operating cycle is geared to split-second efficiency. Indexing is ultra-smooth and extra rapid. Wheel slide retraction after grinding each cam is no greater than maximum stock removal. And the fluid, shockless operation is a sure indication of longer, more profitable service life.

Get All the Facts

on the No. 2 CAM-O-MATIC Grinder from your Norton Representative. Ask him, or write direct, for the 20-page illustrated booklet, No. 195. And remember: only Norton offers you such long experience in both grinding wheels and machines — your assurance of the value-adding, profit-boosting "Touch of Gold." NORTON COMPANY, Worcester 6, Massachusetts.

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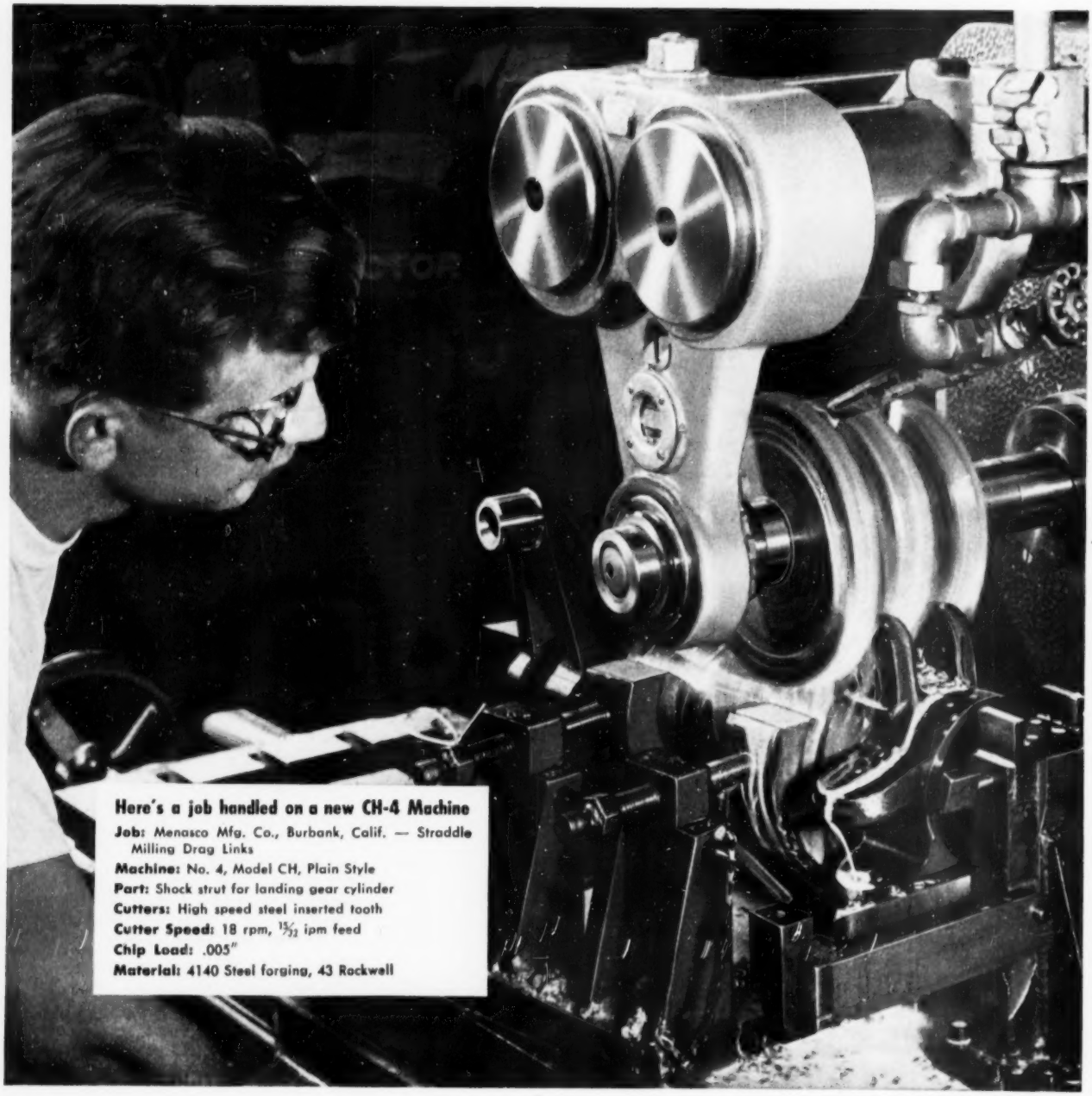
KEARNEY & TRECKER MILWAUKEE

CH MILLING SPEED, ACCURACY



Here's a job handled on a new CH-4 Machine

Job: Menasco Mfg. Co., Burbank, Calif. — Straddle Milling Drag Links
Machine: No. 4, Model CH, Plain Style
Part: Shock strut for landing gear cylinder
Cutters: High speed steel inserted tooth
Cutter Speed: 18 rpm, 15/32 ipm feed
Chip Load: .005"
Material: 4140 Steel forging, 43 Rockwell

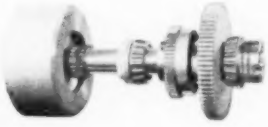
MACHINE COMBINES AND POWER

CH MILLING MACHINE FEATURES THAT HELPED DO THIS JOB BETTER

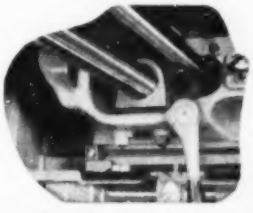
Speed range—*24* speed changes are provided from *15* to *1500* rpm. Automatic protecto-mesh mechanism permits nonclash shifting during speed changes.

Extra wide feed range — *32* changes from ⅜" to *90"* per minute meet requirements of new metals and cutting tools for most efficient operation.

Greater rigidity — Entirely new column . . . heavily ribbed, box section, sponson construction . . . absorbs vibration from heaviest cutting loads.



Greater cutting efficiency through design refinements and a train of heavy duty, wide-faced, forged steel gears, hardened and specially processed for quiet operation.



Smoother feed performance through a heavy duty *2"* dia. table feed screw. *23%* greater bearing contact between screw nut for longer screw life and accuracy.

Greater horsepower through independent drives for spindle, feed and rapid traverse, and coolant. 15 hp delivered to spindle . . . *3* hp for feed and rapid traverse . . . ¼ hp for coolant.

INVESTIGATE the new CH line of milling machines. These and other features are job proven to give you cost-cutting results plus greater productivity, better finished products. Contact our nearest representative or write: Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.

POWERED FOR

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY

PRODUCTION

WARNER & SWASEY Saddle Type Turret Lathes deliver tremendous power for the toughest jobs. The one-piece bed, with integrally cast head and VEE-WAYS, carries massive solid weight at the right places. And with diagonal cross-ribbed reinforcing it insures the rigidity that holds accuracy.

You can really hog off tough metal *fast* with any Warner & Swasey Heavy Duty Machine. You can give the job everything that carbide tooling can take.

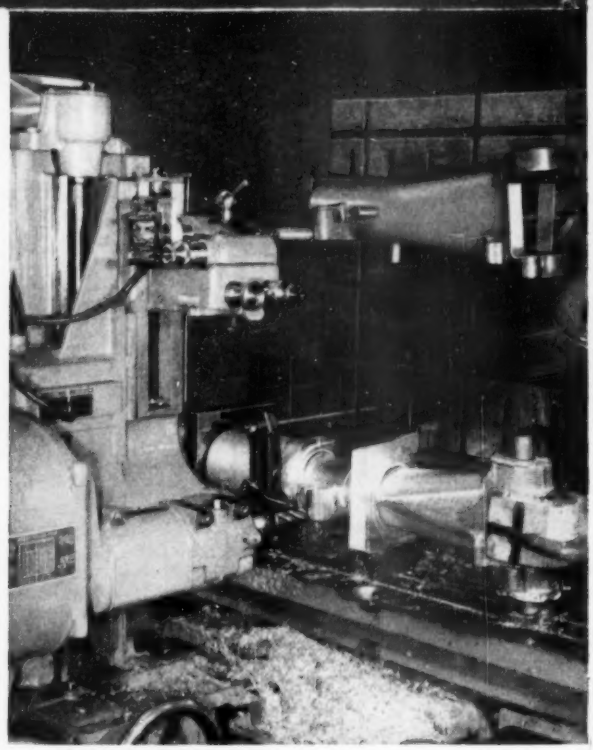
And along with power, these machines have an industry-wide reputation for *holding* their precision accuracy. Warner & Swasey's are built to provide the right combination of power, speed and accuracy for the most rugged, heavy duty service throughout many years of trouble-free service.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

SO MANY JOBS done....

ON A PRATT & WHITNEY TYPE BL KELLER MACHINE *because*



PROTOTYPE Machining of an experimental aircraft part from a solid billet

"KELLERING" REPRODUCES COMPLEX, IRREGULAR SHAPES FASTER, MORE ECONOMICALLY . . . **"KELLERING"** — automatic tracer-controlled milling — easily handles irregular and complex shapes that otherwise would be difficult to machine by any other conventional method. The initial job is done economically, and additional duplicates can be produced at a fraction of the usual time and cost.

KELLERS ARE DESIGNED AND BUILT *SPECIFICALLY* FOR TRACER-CONTROLLED MILLING . . . not just "adapted." Complete, versatile, powerful and provided with a wide range of spindle speeds, they're ready to take on an unlimited variety of jobs without needing major adaptation by expensive attachments.

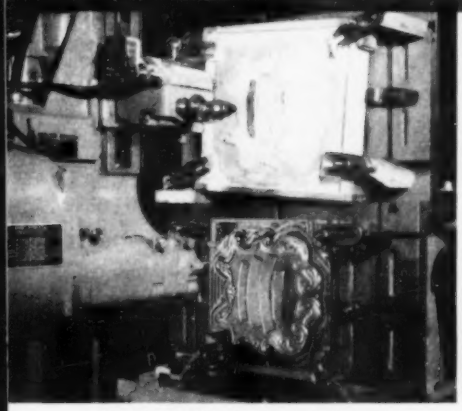
THEY'RE RUGGED, DEPENDABLE, STAY ON-THE-JOB . . . year after year without frequent or expensive maintenance.

HORIZONTAL CONSTRUCTION PROVIDES MAXIMUM STRENGTH, RIGIDITY, EFFICIENCY and CONVENIENCE . . . workholding and positioning are simplified, and the open side construction places no limitation on the size of the work piece. Chips and coolant fall out of the work cavity, cutting is fast and free, without clogging. Operator always has a complete view of cutter and work. Full push button operation is centralized on a single control panel.

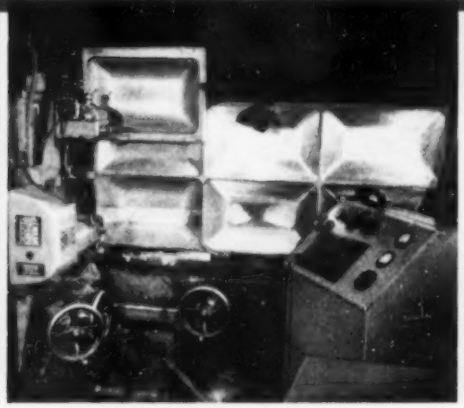
ELECTRIC TRACER CONTROL . . . is dependable, relatively simple and retains its high initial accuracy without frequent maintenance or complicated adjustment. Master forms are duplicated PRECISELY. Machine uses two types of tracer control: ***Profiling*** to a pre-set depth following an outline template; and ***3-Dimensional Milling*** using an inexpensive model as a master.

KELLER TYPE BL IS A VERSATILE, HANDY SIZE MACHINE — JUST RIGHT FOR MANY AVERAGE JOBS IN YOUR SHOP . . . two standard sizes are available, 24" x 16" and 36" x 20" — both with 8" transverse travel. Both can be furnished as Three-Spindle Machines with 8" or 10" center distances between spindles.

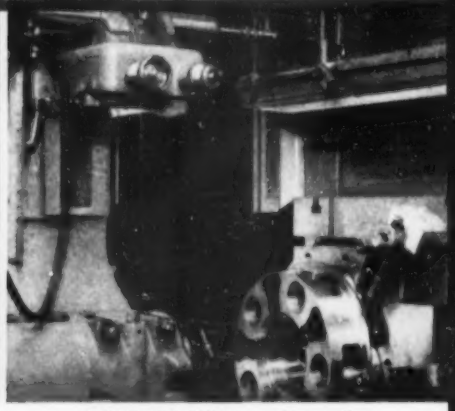
so EASILY... and so WELL



PLASTIC MOLD, intricate 3-dimensional milling from a plaster model



RUBBER MOLDS, six from a single master, for foam rubber pillows

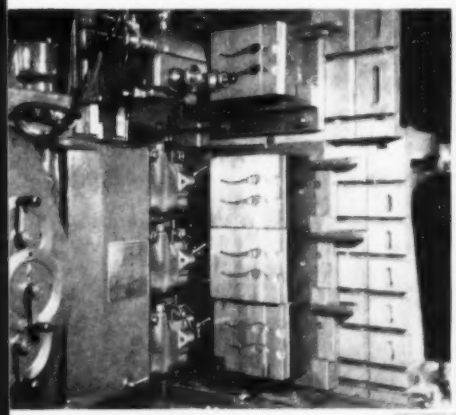


INDEX PROFILING, machining five cavities requires only a single master

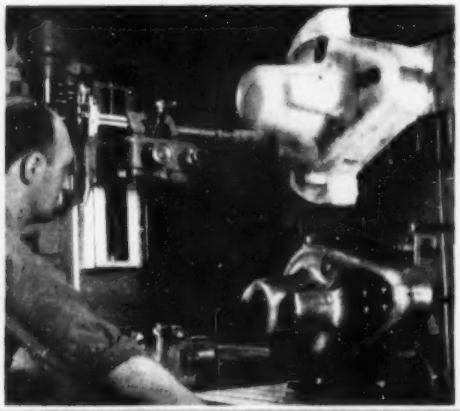
BY TRACER-CONTROLLED MILLING

PLASTIC MOLDS • RUBBER MOLDS • FORGING DIES • METAL FORMING and DRAWING DIES
DIE CASTING DIES • METAL PATTERNS • CAMS • PROTOTYPE WORK • PRODUCTION MILLING
and MANY OTHER JOBS WHERE IRREGULAR SHAPES MUST BE MACHINED

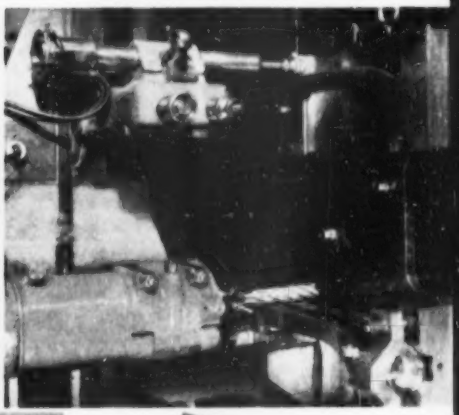
3 FORGING DIES machined simultaneously on a 3-Spindle Keller



DIE CASTING DIE for a power lawn mower motor housing



PRODUCTION MILLING, profiling an aircraft landing gear component



FOR COMPLETE INFORMATION, write us for P&W Circular No. 490-3 fully describing the Type BL Keller Machine.

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

Circular No. 490-3

First Choice P&W *for Accuracy*

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MACHINE TOOLS • CUTTING TOOLS • GAGES

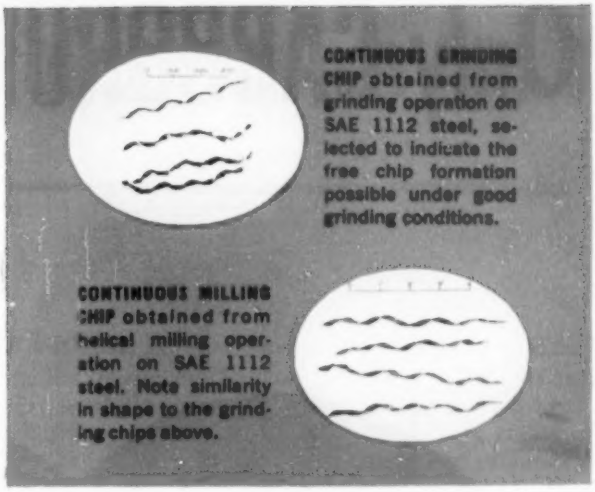
The head of a pin holds these cutting tools . . . . . .

HERE'S THE START OF ENTIRELY NEW CONCEPT IN CINCINNATI GRINDING WHEELS

The starting point of an entirely new approach to grinding wheels is the tiny grinding grit. For years of research by Cincinnati Milling confirms, beyond doubt, that the grinding process is a true metal cutting process. The millions of grinding grits in a grinding wheel do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

This new concept is not based on hasty conclusions. It represents 25 years of Cincinnati Milling research, coupled with practical experience in applying the basic fundamentals of grinding to a wide variety of work on both centerless and centertype machines.

Here is the starting point of the development of the grinding wheel as a true cutting tool. And it is a development you might expect from Cincinnati Milling, with



CONTINUOUS GRINDING CHIP obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible under good grinding conditions.

CONTINUOUS MILLING CHIP obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips above.

the world's largest background of research and experience in metal cutting operations.

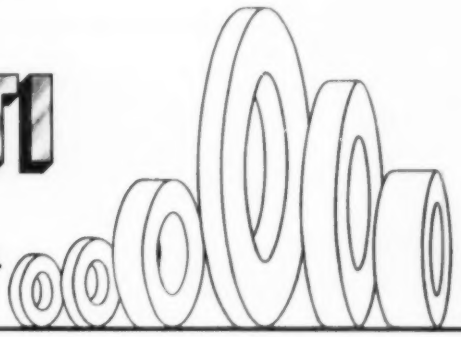
For you, this means grinding wheels developed and tested over a period of years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.

FREE BOOKLET. Now available to industry is a new booklet entitled "A New Concept In Grinding Wheels." It contains valuable information for everyone interested in grinding operations. A copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

TRUE VALUES of grinding wheel wear are obtained by instrument which gives consistent measurement of changes in wheel radius within .00005".

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



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You get UNBIASED COUNSEL based on all abrasive methods

Your business, in mass production of parts or finished assemblies, is the problem of generating close tolerance sizes, of producing high surface finishes, of removing stock. The business of CARBORUNDUM is the exclusive ability to recommend and furnish you the specific type of abrasive product which will give you highest quality at lowest cost, on every operation you perform.

Take off-hand grinding, for instance. You can count at least 7 different abrasive methods of off-hand grinding. How can you be *sure* the method you are using is the best —the lowest in cost? By asking CARBORUNDUM... for CARBORUNDUM alone has a complete, branded line of grinding wheels *and* abrasive belts *and* tumbling and polishing grains. Only CARBORUNDUM can recommend without bias, on the sole basis of what's best for you.

Or suppose you manufacture fountain pens. You can finish and polish the barrels with abrasive belts or grinding wheels... you slit the points with a tiny grinding wheel... finish the clips with tumbling abrasives. CARBORUNDUM alone gives you *one-source control* of abrasive quality, on every type of abrasive you use...quality that's constant, identical, dependable—thus economical.

Several ways to do one operation? Call in CARBORUNDUM. Several processes on one part? Call in CARBORUNDUM. Either way, you win.

Call your CARBORUNDUM *Salesman or Distributor* today!

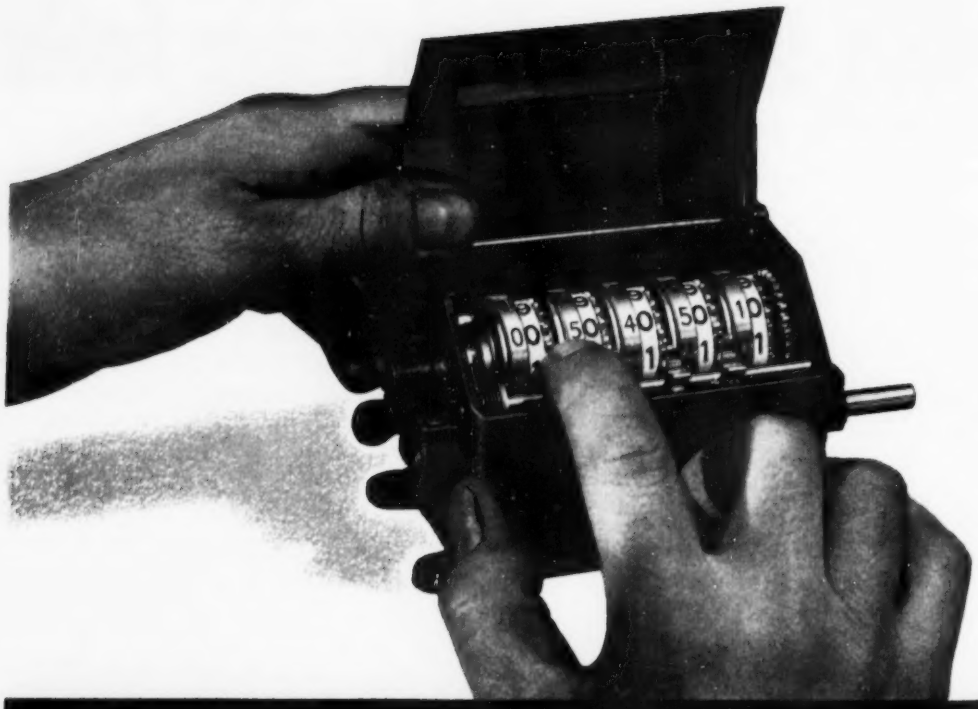
He's your best bet for complete stocks, prompt delivery... and best of all, experienced counsel on *every* new development in the *entire* field of abrasives. He's in the yellow pages under "Abrasives" or "Grinding Wheels." Phone him today—it's to your profit!

Ready now—your free copy of the new big COATED ABRASIVE SELECTOR catalog... containing detailed recommendations for both machine and hand sanding operations on tough and soft metals, glass, plastic, wood. Phone for it today.

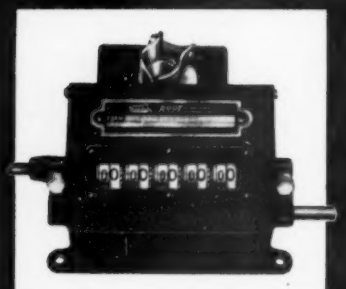
RUNDUM

MARK

... the ONLY source for EVERY abrasive product you need



You get what you set...



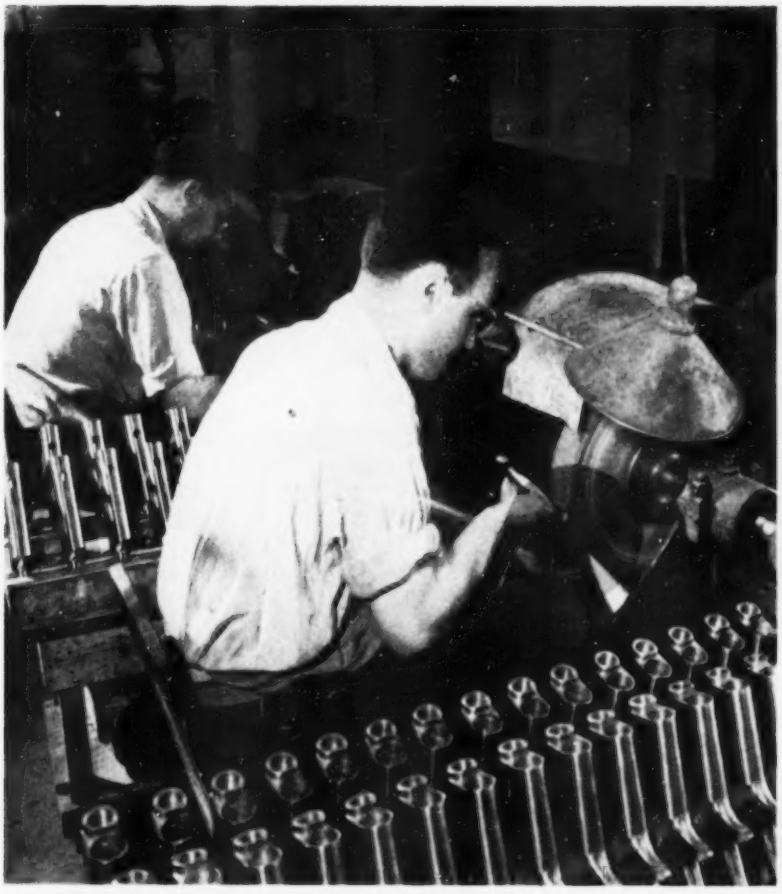
Added Evidence that—

Everyone Can Count on VEEDER-ROOT

Set the predetermining wheels for any run you want. Then, when the counting wheels reach the pre-set number, an electrical contactor makes or breaks the circuit to light a light, ring a bell, or trigger a stop-motion. Yes, this V-R Predetermining Counter is an efficient variable control for *many* types of stop-motion. Short runs and over-runs are prevented on a wide range of machinery, from coil winders to textile looms. Now, figure out how *you* can use this Cost-*Count*rolling Counter. Then write:

VEEDER-ROOT INCORPORATED
"The Name That Counts"
HARTFORD 2, CONNECTICUT
Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C.
Montreal 2, Canada • Dundee, Scotland
Offices and Agents in Principal Cities

"Counts Everything on Earth"



Gun polishing with Norton ALUNDUM abrasive. This man has the "Touch of Gold." His work is fast, precise and low in cost. Uniform-sized grain means better quality finishes.

High capillarity Norton ALUNDUM abrasive soaks up water in test; does the same with glue on the job . . . assuring stronger, faster-cutting polishing wheel.

Polish with the

"TOUCH OF GOLD"

You get the right combination for fast and profitable work in Norton ALUNDUM* Abrasives

Every *grain* of Norton ALUNDUM polishing abrasive does its full quota of work! That's one reason your operators get the "Touch of Gold" that adds to the appearance and quality of your product . . . increases your profit margin, too.

You get better polishing at lower cost with ALUNDUM abrasive because each grain is identical with the next . . . hard, tough, long-lived and exact as to size and shape. No oversize grains to mar surfaces — no undersize grains to loaf on the job. Capillary tests show that Norton abrasive grain adheres tightly to the wheel until all its work is done. This assures better performance and longer life — greatest efficiency for you.

Fast service from your Norton distributor brings you the exact type of ALUNDUM polishing abrasive you need. He is backed by complete stocks at key industrial centers, ready for shipment in convenient container sizes . . . and by the specialized experience of Norton field engineers. Or you can write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES
Making better products to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

G-256

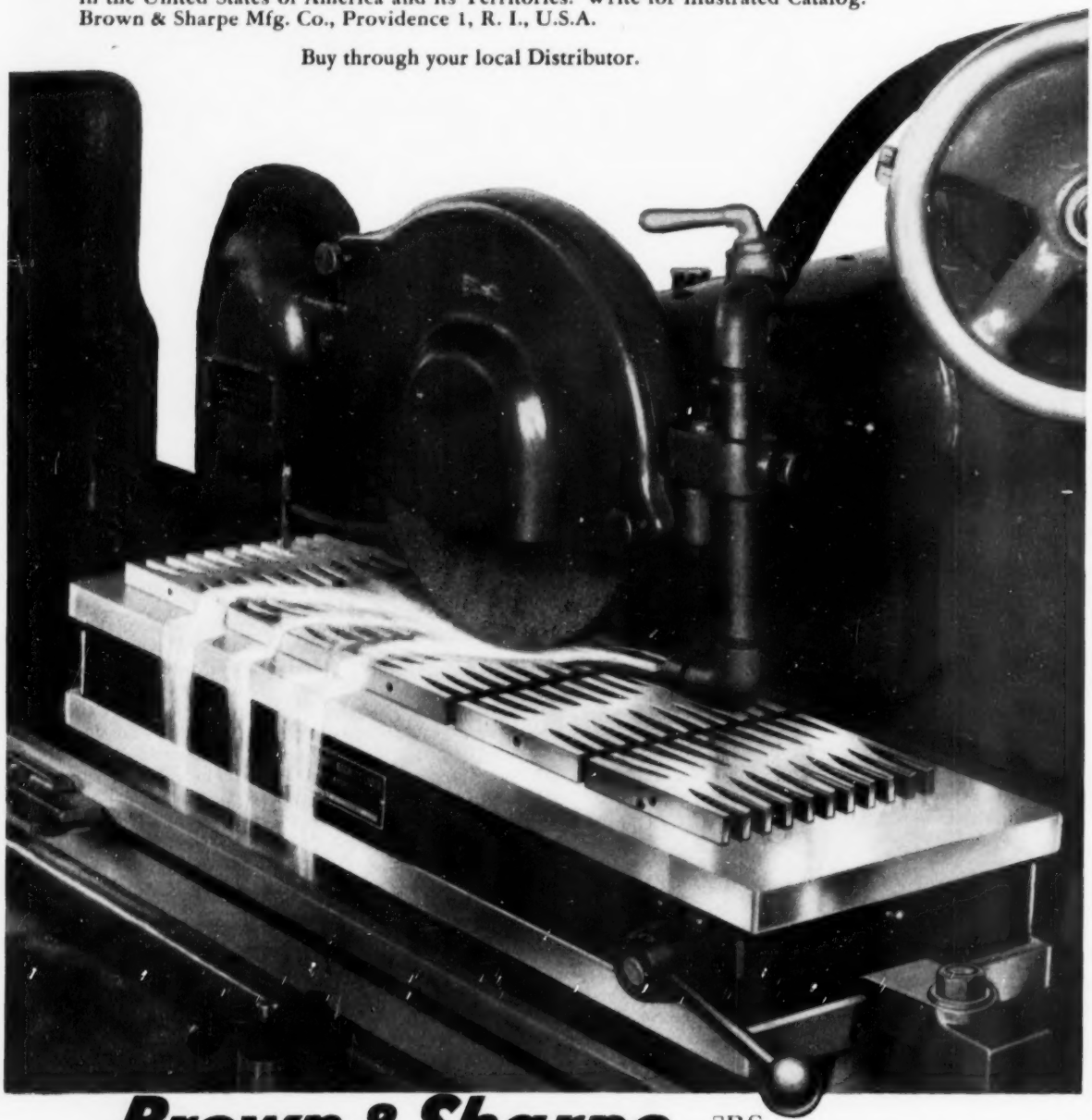
Work Holding Short-cut that never Short-circuits . . .

Permanent Magnet Chucks

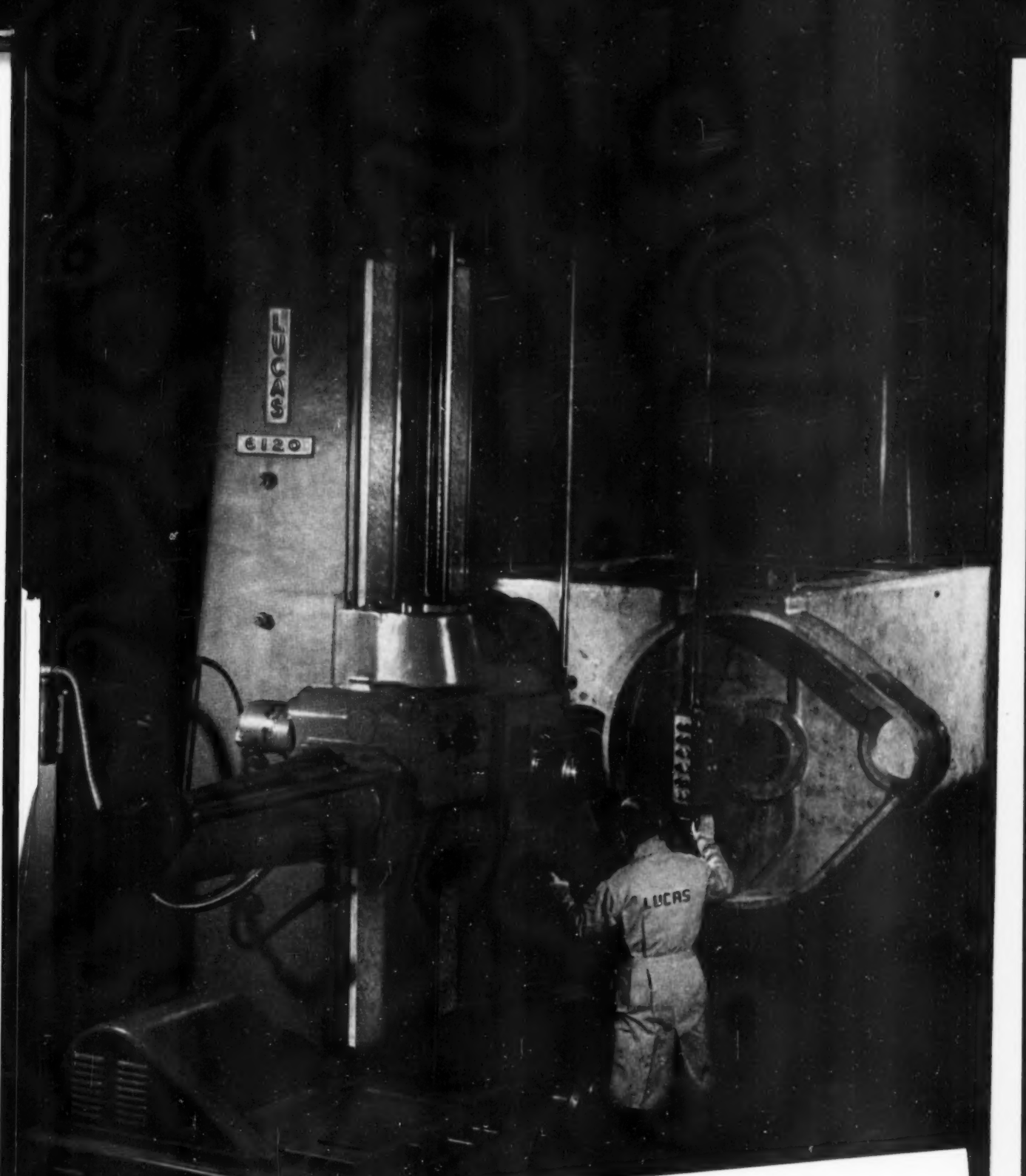
Wet grinding, as well as other light machining operations and inspecting, is *safely* accomplished on Brown & Sharpe Permanent Magnet Chucks. No electric current is used . . . no danger of wires short-circuiting or power failure. Just shift a lever and magnetic power holds work securely for as long as desired. Completely self-contained and portable, you can use one chuck for several machines, or on the bench.

Complete line of 11 sizes in both rectangular and rotary models. For sale only in the United States of America and its Territories. Write for illustrated Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

Buy through your local Distributor.



Brown & Sharpe B·S

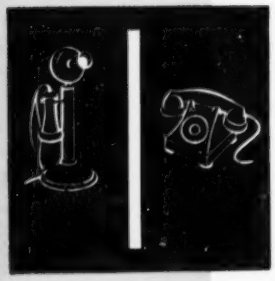


The operator controls all functions of the machine from one pendant on a Lucas – an especially useful feature on a machine of this size.

Machines for Making Progress

When a manufacturer says sales are "so-so" today he is probably talking about a volume beyond his fondest dreams of a dozen years ago. But payroll, fringe benefits, taxes, material costs, and generally increased expense may have turned a period of booming sales into one of profitless prosperity.

In such a situation a manufacturer's best friends are his machine tools. But such tools must be much more than mechanically sound — they must have the accuracy and productivity that 1953 standards demand, or they might just as well be worn out.



New Britains are *machines for making progress.* More important — they're *machines for making profits.*

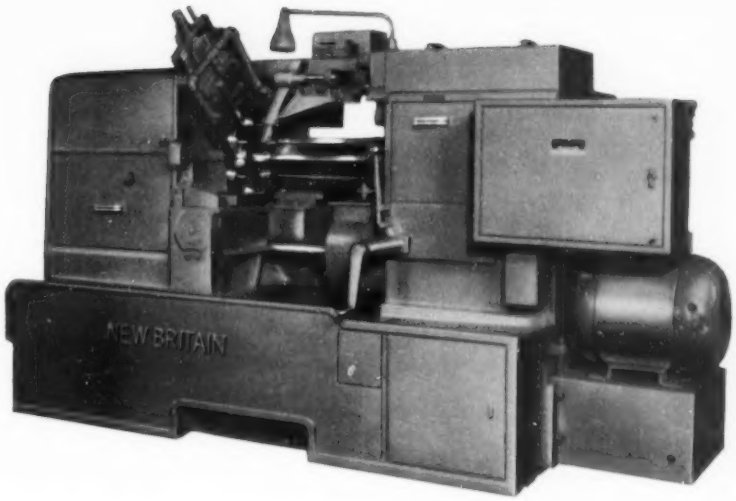
AUTOMATIC BAR AND CHUCKING MACHINES
PRECISION BORING MACHINES
LUCAS HORIZONTAL BORING, DRILLING & MILLING MACHINES
NEW BRITAIN +GF+ COPYING LATHES

THE
NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division
New Britain, Connecticut
Lucas Machine Division
Cleveland 8, Ohio

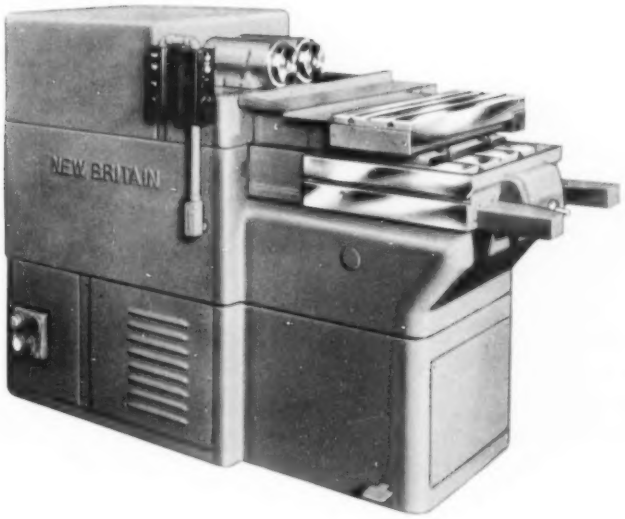
MODEL 61

New Britain builds a complete line of multiple spindle bar machines in a range of sizes up to 2¼" dia. Ruggedly built, they are capable of doing heavy duty jobs, running at high speeds and consistently holding close tolerances. These automatics with their time-tested, profit-producing features are constantly proving themselves in modern high production plants.



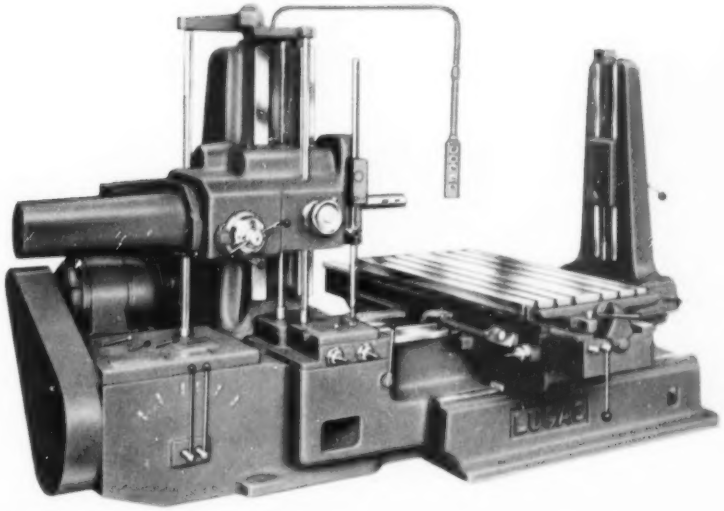
MODEL 37

New Britain makes a complete line of cam controlled precision boring machines for both straight and contour work. Model 37, illustrated, generates all types of radii, chamfers, undercuts, grooves, faces, etc., plus straight boring and turning. A fast, accurate, positive, and simple machine, it reduces the manufacturing cost of a wide variety of sizes and types of pieces.



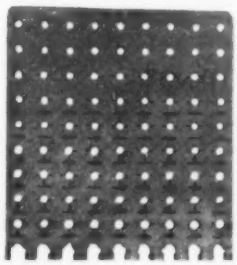
LUCAS Precision

A Lucas Precision Horizontal Boring, Drilling and Milling Machine will perform many operations in sequence on one piece or a thousand, from small components to large weldments like the one shown in the photo on the front side of this insert. It will not only make heavy roughing cuts but will also finish to the close tolerances required in today's precision manufacturing. It is quickly set up for short runs and incorporates Automatic Power Positioning for multiple operation work.

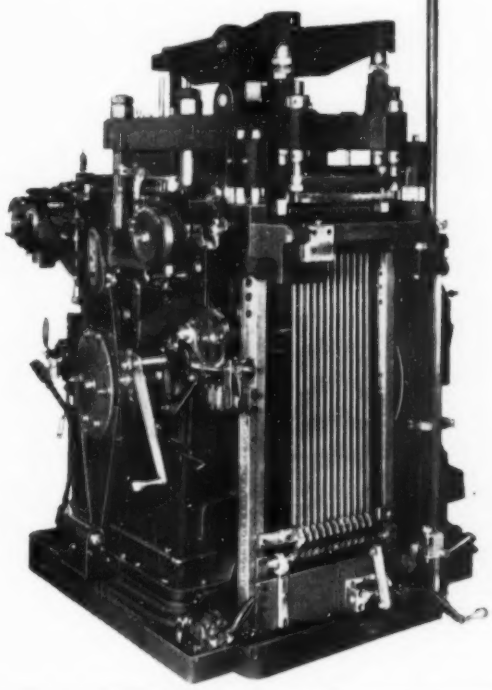


New Britain cam controlled
precision boring and turning machines
reproduce size and finish with
absolute certainty piece after piece,
hour after hour, day after day.

this condenser "assembled for nothing"



Henry & Wright 50-ton Dieing Machine With Special Assembly Unit



Henry & Wright Dieing Machine stamps out fins and then fits them onto tube at high speed . . .

This single Henry & Wright Dieing Machine does the work of several ordinary presses and a benchful of assemblers. First, the fins are partially completed via progressive stamping, at the rate of 120 strokes per minute. Next, the fins are fed onto the serpentine tube, fitted and cut off from the strip. The operator simply removes completed core and puts a new tube in the assembly fixture.

Combining high speed with long die life, the Henry & Wright Dieing Machine provides a production tool basically designed for new and improved methods. From simple blanking to complex operations, you can count on a price cut with every stroke.

LATEST CATALOG

See how you can use Henry & Wright Dieing Machines to modernize your operations. Write Henry & Wright, 481 Windsor St., Hartford, Connecticut.

Only the best is good enough

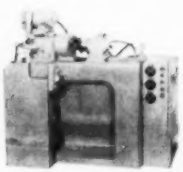
HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

bryant
internal grinding

no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".

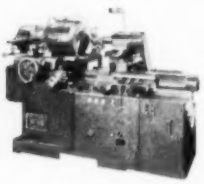


no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".

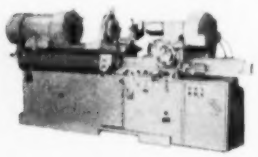
no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



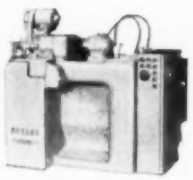
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



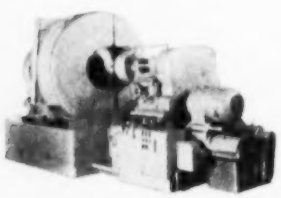
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



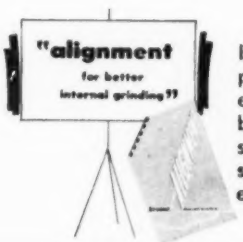
no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".

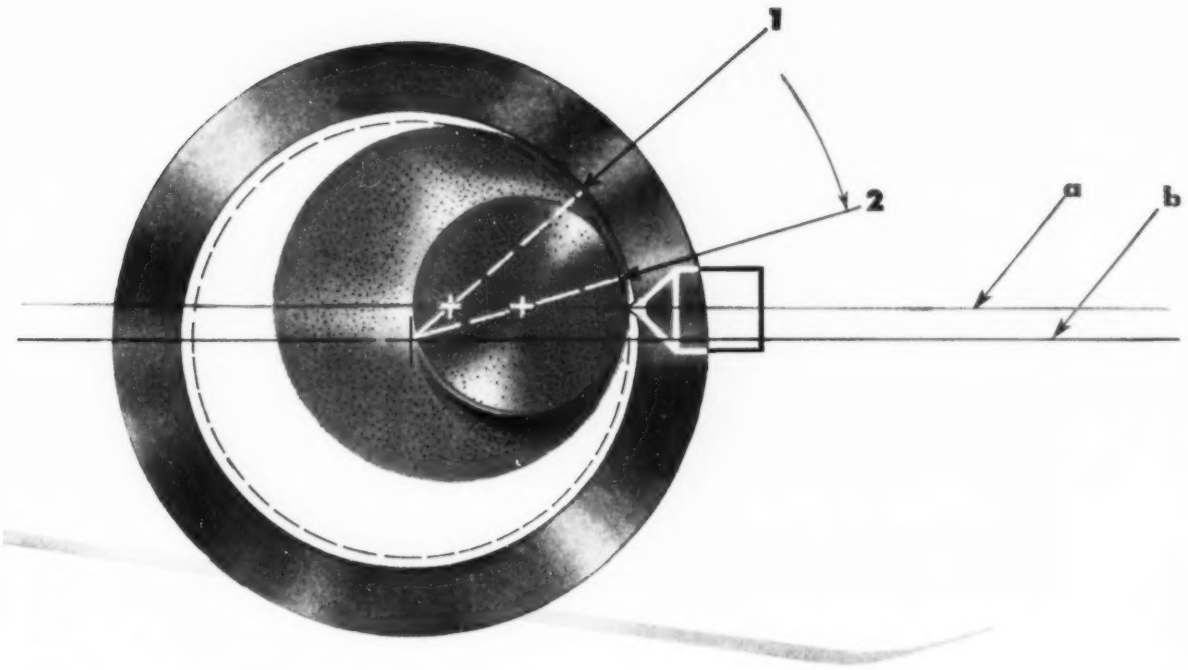


no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie — free showings arranged for engineering groups.



IF the internal grinder is to generate straight holes within precision tolerances, on a production basis, the various elements of the machine must be properly aligned. The axis of the work, the axis of the wheel, and the diamond must be in a plane parallel with both traverse and cross feed ways. Then the direction of feed will coincide with the line from the center of the workpiece to the point of contact between the wheel and the work, and the wheel will be dressed in line with its point of contact with the work regardless of the size of the wheel.

In the illustration above, these requirements are not met because the work center "b" is below plane "a" established by the wheel axis and the diamond. The drawing shows the wheel at its largest diameter (new) and also at its smallest diameter (worn). The difference between center heights "a" and "b" is constant during the life of the wheel. The position of the diamond remains constant for the life of the wheel. When the large wheel is dressed by the diamond it will contact the work at a point established by a line from the center of the work through the center of the wheel (position 1). When diamond sizing, the work, or wheel, is fed to a predetermined position. As the wheel wears down, it will continue to contact the diamond at the same point during dressing, but the small wheel will contact the work at position 2 and the size of the finished hole will be substantially smaller.

As the wheel wears, the point of contact between wheel and work will move gradually from position 1 down to position 2, and the size of the finished hole will become progressively smaller. This is one of the reasons that some internal grinders, when set up for diamond sizing, will not hold size during the life of the wheel. Many operators attempt to compensate for this error by constantly adjusting the diamond. The correct remedy would be to bring the axis of the work, the axis of the wheel and the diamond all into a common plane parallel with both traverse and cross feed ways. Finish size will then be correct regardless of wheel diameter.

Bryant Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

get
a
better
job done

with

Mor-Speed

save time

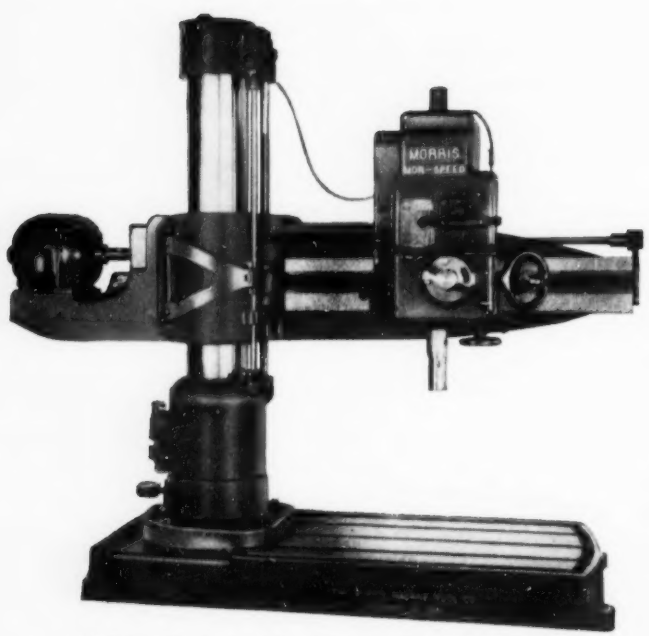
with completely centralized controls . . . instant selection of proper speed, feed; easily set automatic stops and trips.

with safety and dependability

tested safety devices safeguard machine, worker, workpiece . . . automatic lubrication protects built-in precision.

with lasting accuracy

alloy steels . . . modern hardening . . . extra anti-friction bearings, all assure minimum wear and low cost service.



9" Column Standard and Heavy Duty Models (with 3 and 4-foot arms)

11" Column Heavy Duty Model (with 3, 4, 5 and 6-foot arms)

Morris MOR-SPEED RADIALS

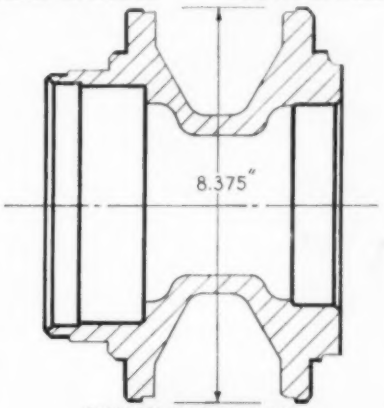
Whether for production or tooling MORRIS Mor-Speed RADIAL DRILLS give you fast, easy operation with accuracy so essential in holding down costs. Write for bulletin #59. Early deliveries available.

THE MORRIS MACHINE TOOL COMPANY
933 HARRIET ST. CINCINNATI 3, OHIO

Morris

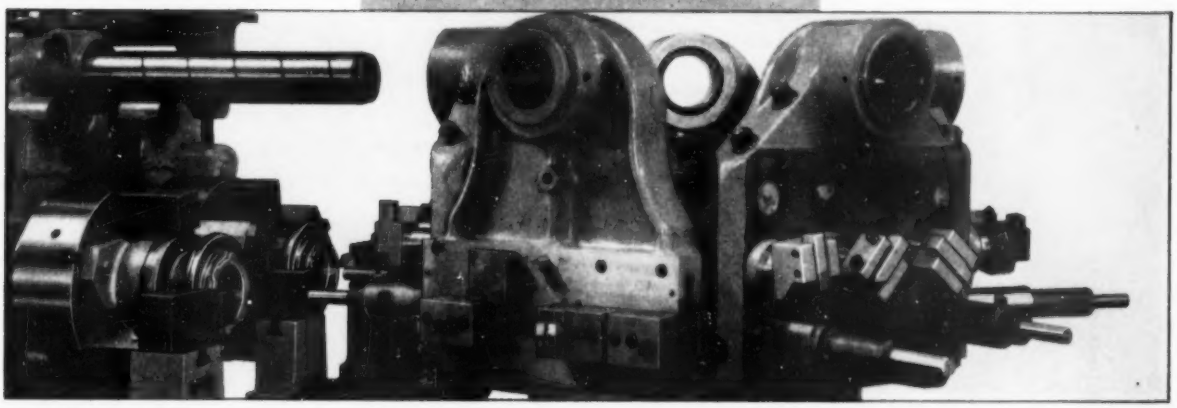
"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."

COMPLETE ... IN 38 OPERATIONS

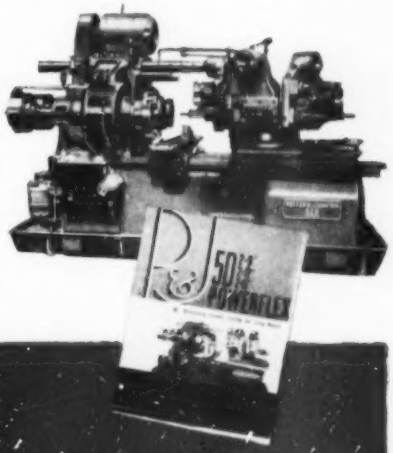


SURFACES MACHINED ARE INDICATED BY HEAVY LINES

... in ONE TURRET CYCLE



with a 5D-2 Powerflex TWO-SPINDLE Automatic Turret Lathe plus P&J TOOLING



Looking for production geared to today's demands for increased output at lower costs? You'll find the answer in a P&J 5D-2 Two-Spindle Automatic . . . with P&J Tooling that makes the most of this machine's great production potential.

Two spindles give far greater output than the best obtainable from single spindle machines; initial costs, power consumption, floor space and operator attention are all much less than that required by two single-spindle machines. The result is **cost-cutting performance.** One of these malleable iron rollers is completed every **4.04 minutes — floor-to-floor time!**

Get complete information about doing your tough, costly jobs the fast, economical P&J way. Send for your copy of 5D-2 POWERFLEX Bulletin 123 — or ask P&J Engineers to submit tooling recommendations based on your own prints or sample parts.

POTTER & JOHNSTON CO.
PAWTUCKET, RHODE ISLAND
SUBSIDIARY OF
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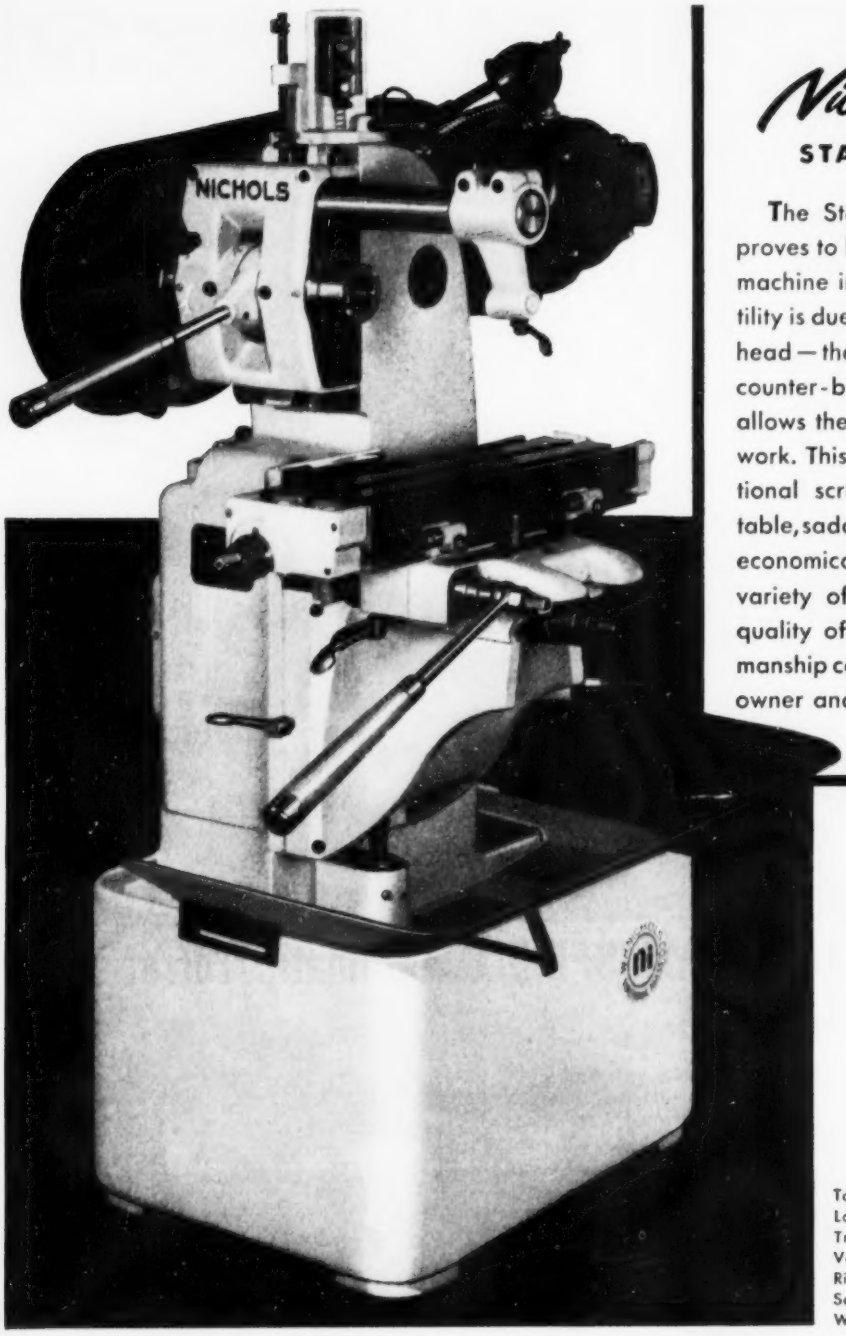
DIVISION NILES-BEMENT-POND COMPANY

P&J



Nichols Miller

STANDARD MODEL

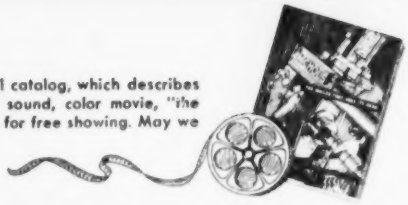
The Standard Nichols Miller often proves to be the handiest (and busiest) machine in the shop. Its unusual versatility is due to the "rise and fall" spindle head — the spindle being mounted in a counter-balanced sliding head which allows the cutter to be brought to the work. This unique feature, plus conventional screw or lever movements of table, saddle and knee, guarantees fast, economical production on the widest variety of parts. And the unexcelled quality of Nichols' design and workmanship commands the respect of every owner and operator.

"the miller that uses its head!"

CONDENSED SPECIFICATIONS

Table Working Surface	6¾" x 21" or 30"
Longitudinal Travel	10" or 19"
Transverse Travel	7"
Vertical Travel—Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges	up to 5000 R.P.M.
Weight	1250 lbs.

Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie, "the Miller that Uses its Head" is available for free showing. May we reserve it for you?



MANUFACTURED BY W. H. NICHOLS COMPANY • WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

76-F MAMARONECK AVE.
WHITE PLAINS, N. Y.

They wouldn't believe it either

— until they SAW it!

Seeing was believing for a group of mechanical officials from one of the mid-west's [illegible] earth moving equipment builders.

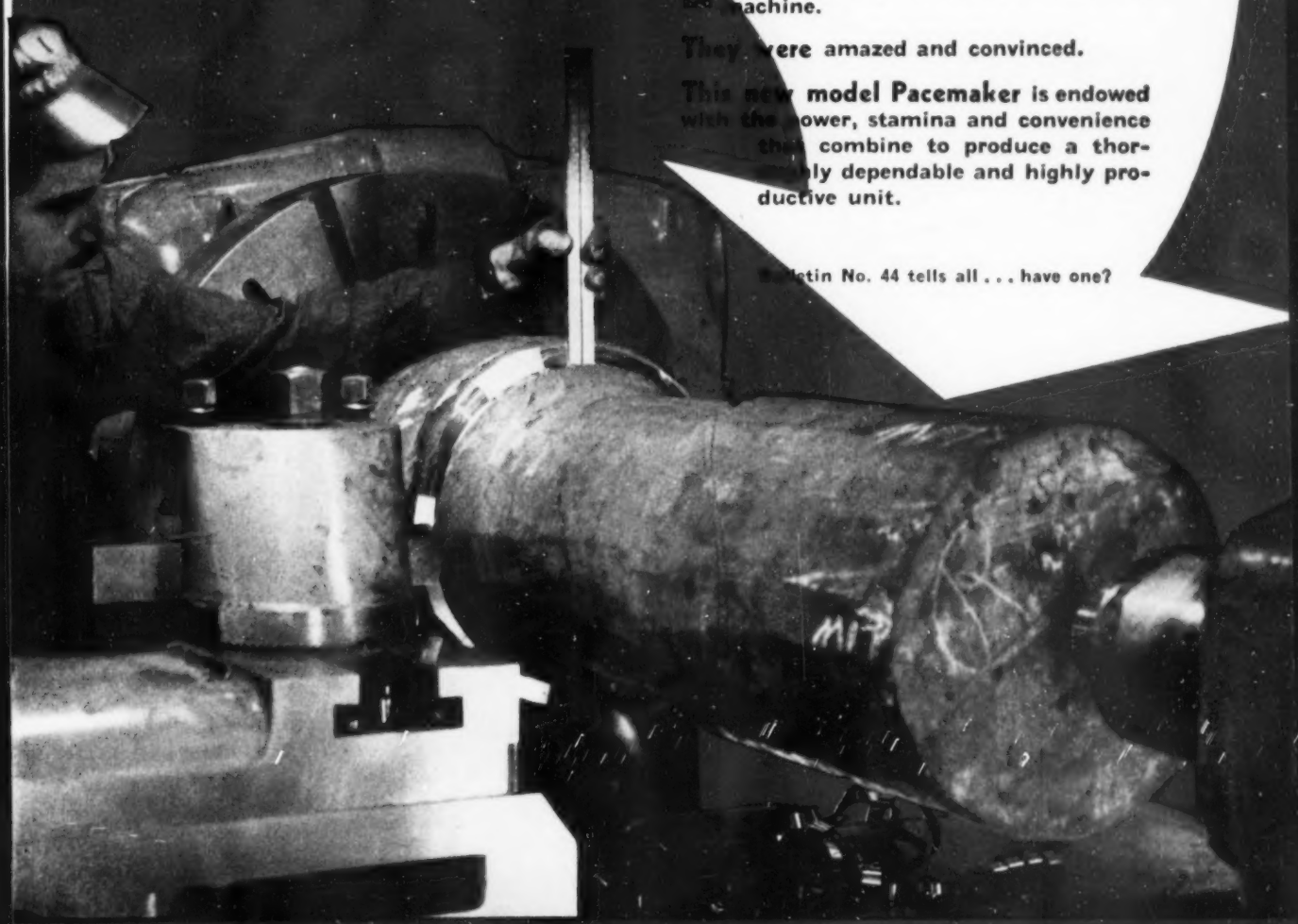
Frankly they just wouldn't believe that the new 30" "AMERICAN" Pacemaker Lathe would effectively use 60 horse power and cemented carbide cutting tools in machining rough and tough alloy steel forgings. So they came to see for themselves and they saw:

1. Cuts 1 3/8" deep.
2. Cutting speed 300 feet per minute.
3. .030" feed.
4. 60 horse power registered by horse power meter during the maximum cuts.
5. Not a shimmy or whimper from the machine.

They were amazed and convinced.

This new model Pacemaker is endowed with the power, stamina and convenience that combine to produce a thoroughly dependable and highly productive unit.

Bulletin No. 44 tells all . . . have one?



THE AMERICAN TOOL WORKS CO. Cincinnati, Ohio U.S.A.

LATHES AND RADIAL DRILLS

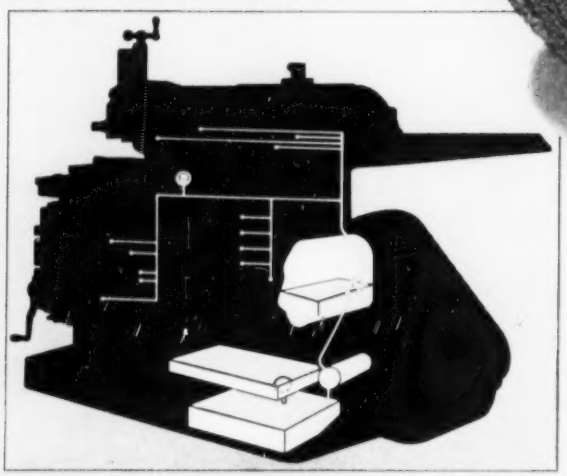
50 lbs. oil pressure

IS NECESSARY WITH A CUT LIKE THIS...

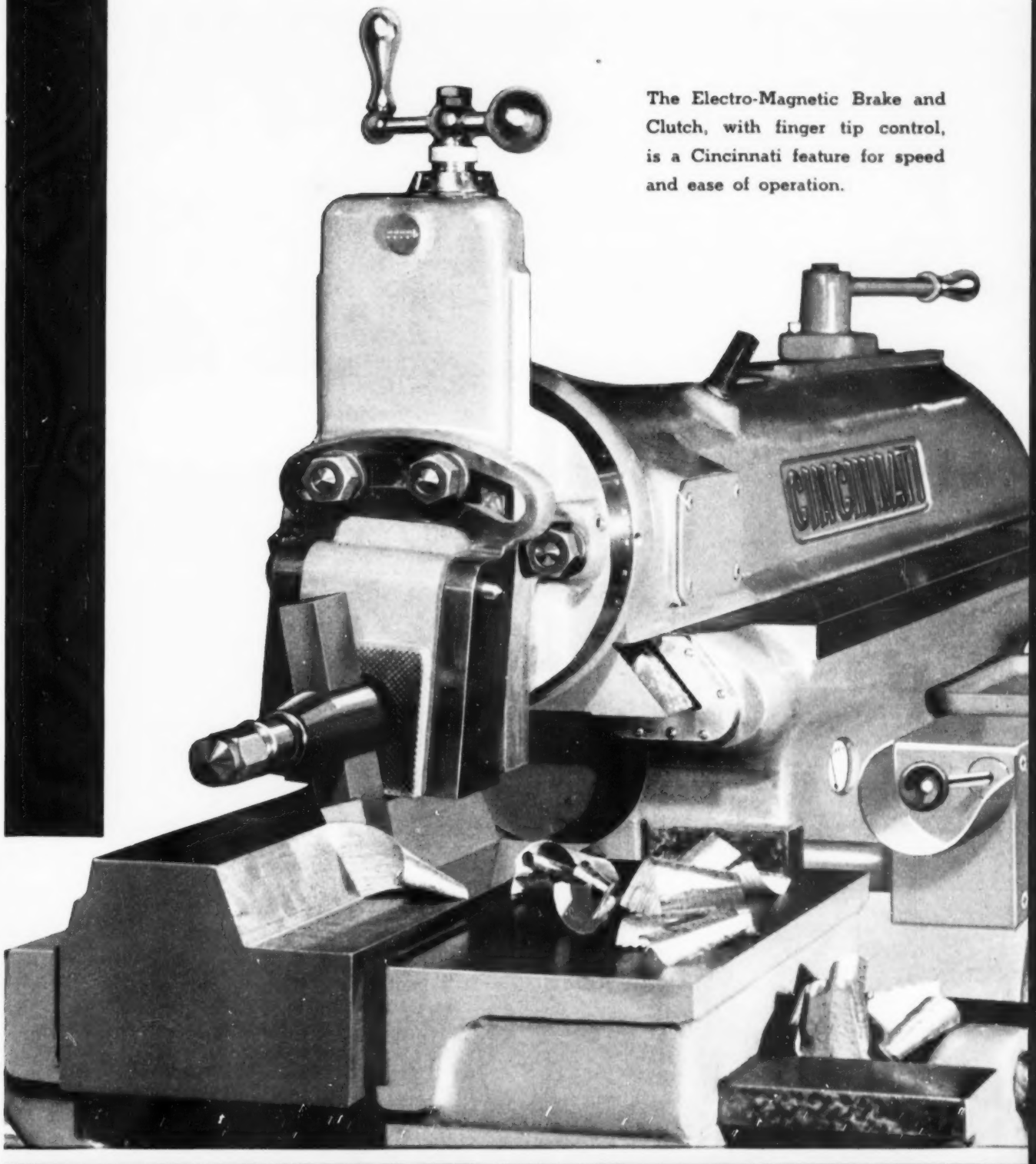
This tremendous cut demonstrates the extra strength, rigidity, and power in Cincinnati Shapers. It also demonstrates the ability of the 50 p.s.i. lubrication system to develop and maintain oil films under the heaviest loads.

Write for Catalog N-5.

Demonstration cut.
Actual size steel chip, 2" cut .030" feed
Cincinnati 24" H.D. Shaper.



50 p.s.i. system includes 50 micro filter, settling basin and reservoir. Transmission runs submerged in oil.

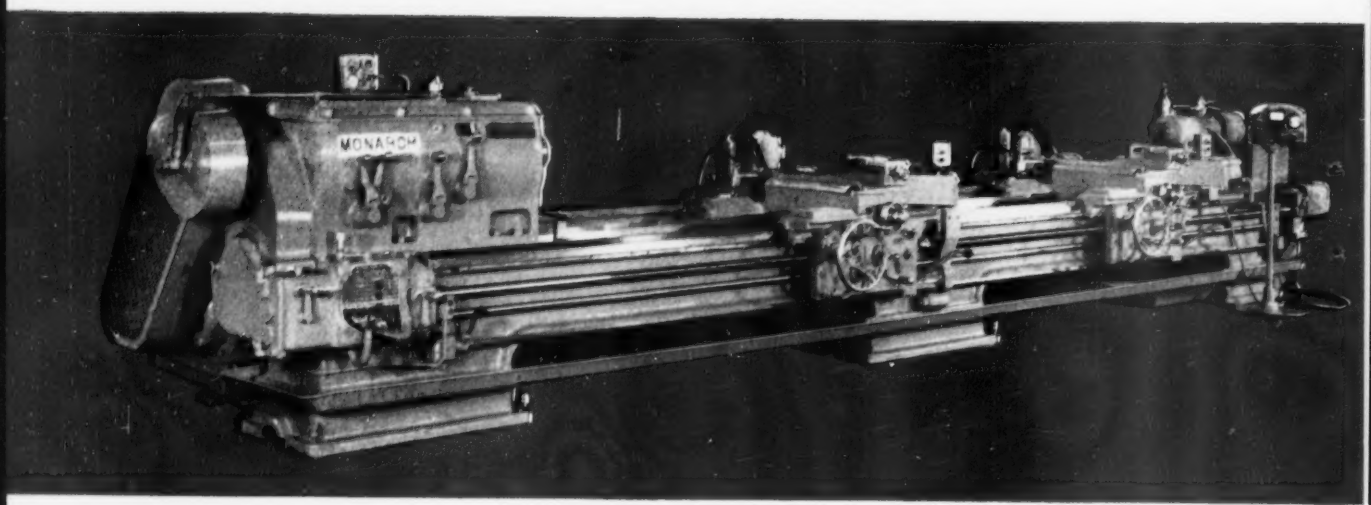


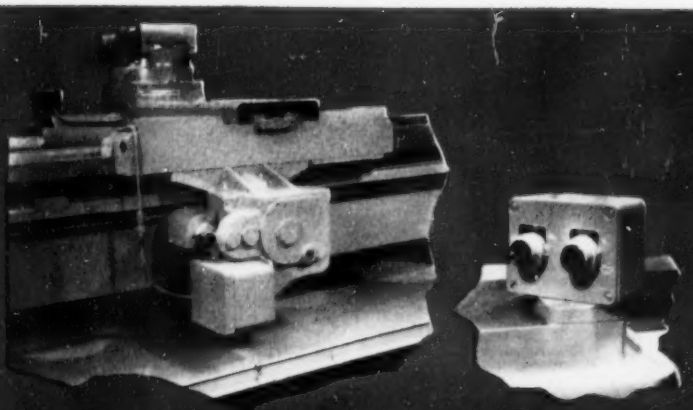
The Electro-Magnetic Brake and Clutch, with finger tip control, is a Cincinnati feature for speed and ease of operation.

THE CINCINNATI SHAPER CO.

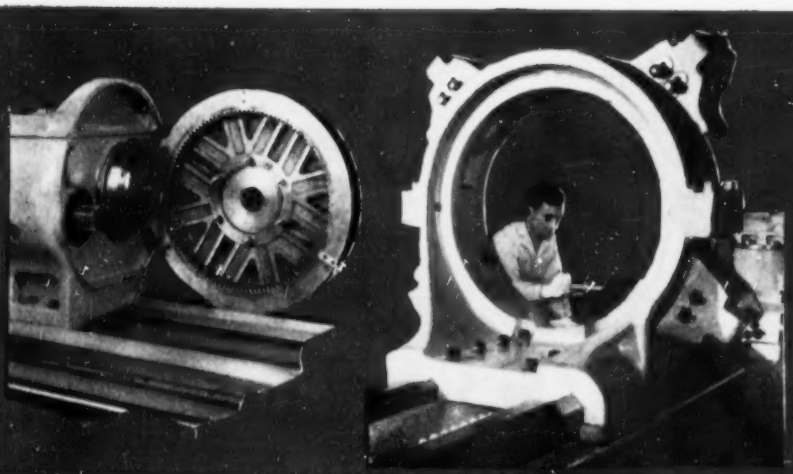
CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI





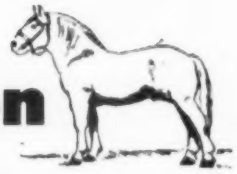
PLUS CONTROL. A smoothly functioning rapid traverse in either direction is furnished by unit mounted at rear of machine (left). Push button controls on front carriage wing (right) give instant response only when depressed. Standard on 25" Model N and 32" Model NN, optional on 20" Model M.



PLUS POWER. For heavy stock removal from large diameter work, the optional face plate drive headstock is a "must" (left). It insures full, even delivery of power under load. Drive may also be taken through spindle. Steady rests of great capacity and strength are provided. This one (right) will take work 36" to 38½" diameter.

Monarch 25" Model N with long bed. Note optional dual carriages—ideal for peak production on long shafts and gun barrels. Perfect performance is noted with two tools turning simultaneously. Air-Gage Tracer Controls can be supplied for both carriages (as shown), either carriage, or neither. Monarch-Keller controls can also be furnished.

BIG Monarchs



Powered like a Percheron

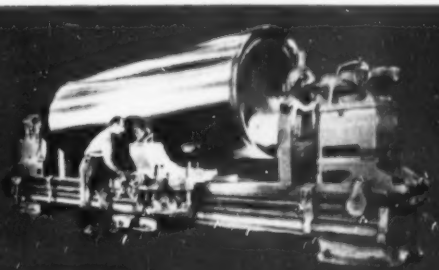
Nimble as a Pony

Imagine a great steel-muscled Percheron with the instant, spirited responsiveness of a polo pony—and you've got a picture of the Monarch Heavy Duty Lathes. Here are lathes with the size, power and rigidity to hog off heavy cuts from big work—yet built to provide high finish, close accuracy and convenience of operation! Witness the great number of them—both with and without Air-Gage Tracer controls—speeding production of critical jet aircraft parts today.

Here's unequaled strength and versatility within the capacities offered—20", 25" and 32" swings in standard lengths up to 324" between centers. Look at the special features and applications we've found room to illustrate here. Then write for our Booklet #1208—36 pages of data and pictures—for the complete Monarch Heavy Duty Lathe story. We'll send it gladly . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES



PLUS SWING. For maintenance and repair work—for occasional big parts, light cuts on big diameters, and turning shafts with previously machined large sections, plus swing up to 60" and more can be provided. This Model SN, shown turning a paper machine drum, swings 84"

NOT A COST, BUT AN INVESTMENT

That Pays Year After Year . . .

Buy ARMSTRONG TOOL HOLDERS and TOOLS for today's job and they will bring you added profits thru the years. With ARMSTRONG TOOL HOLDERS you will be permanently tooled up for whatever comes, for each is a multi-purpose tool that takes cutter bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slotters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

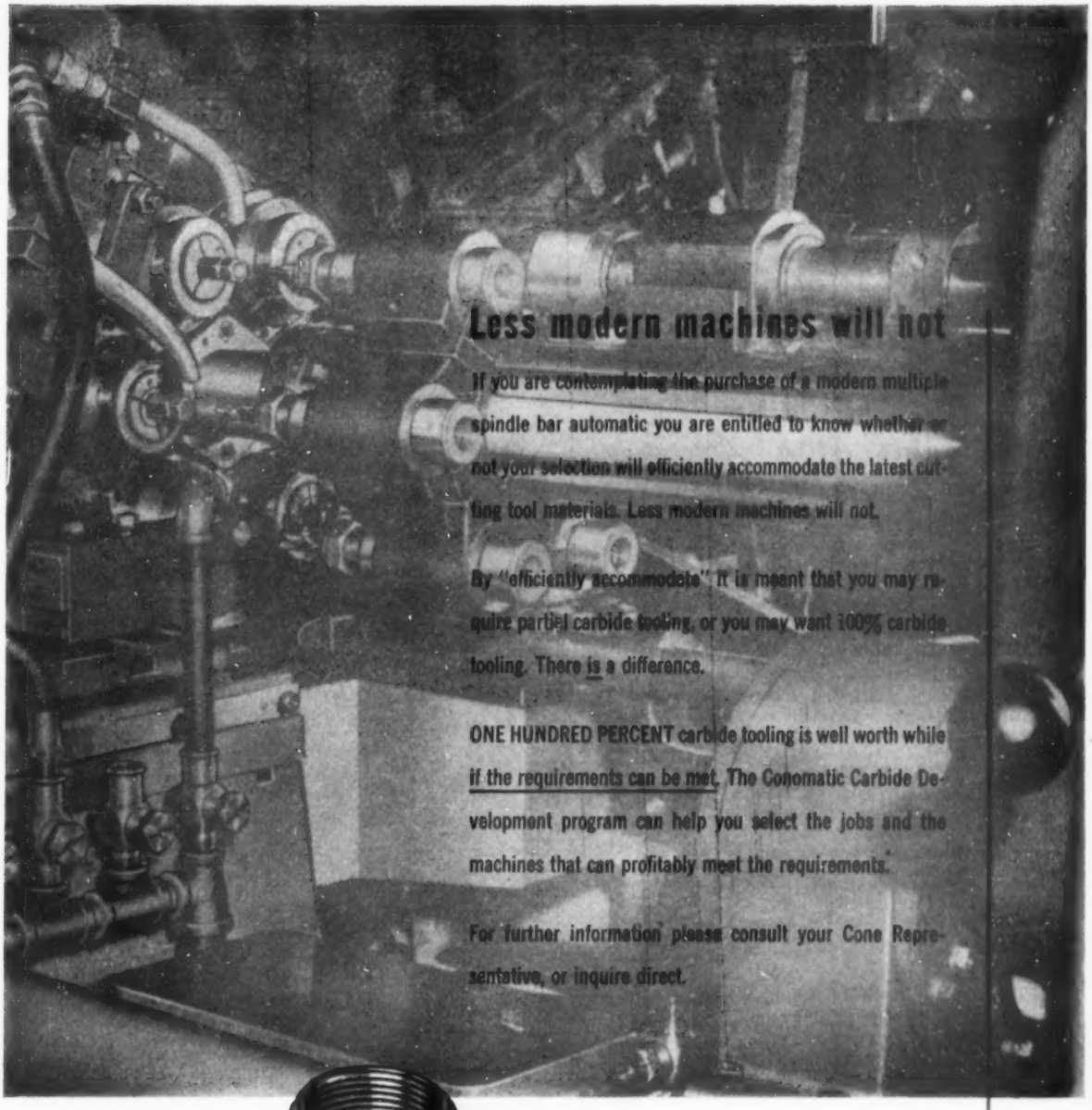
ARMSTRONG Lathe and Milling Machine Dogs are permanent tools too. They are drop-forged from special open hearth steel, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-tapping.

ARMSTRONG Quality pays back over and over again. *Write for new S-48 catalog.* It offers many opportunities to conserve profits.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.



Less modern machines will not

If you are contemplating the purchase of a modern multiple spindle bar automatic you are entitled to know whether or not your selection will efficiently accommodate the latest cutting tool materials. Less modern machines will not.

By "efficiently accommodate" it is meant that you may require partial carbide tooling, or you may want 100% carbide tooling. There is a difference.

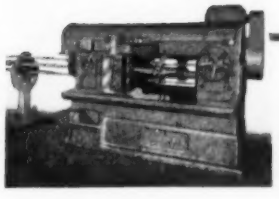
ONE HUNDRED PERCENT carbide tooling is well worth while if the requirements can be met. The Conomatic Carbide Development program can help you select the jobs and the machines that can profitably meet the requirements.

For further information please consult your Cone Representative, or inquire direct.

MATERIAL—1040 STEEL

	HSS	CARBIDE
Cycle Time	*	30 secs.
Work Spindle Speed	*	670 R.P.M. at 160 S.F.
Tool Wear	*	2000 pcs. per grind

*Hot rolled material prevents fair comparison



Conomatic }

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

GET FAST, ECONOMICAL PRODUCTION with *American*

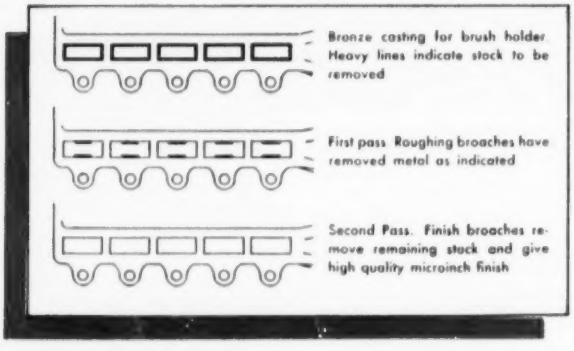
5 slots Broached on brush holder with *American* Broaching Machine

To speed production and cut costs on a motor brush holder, American engineers developed a Special T-20-42 broaching machine. This machine is designed to broach five parallel rectangular slots with a high quality micro-inch finish. The complete operation is performed in two passes, eliminating any need for costly internal grinding or hand finishing.

Here is the simple five step operating sequence:

1—Operator loads and clamps part in fixture, locating from previously machined surfaces.
2—Manually controlled retriever unit lowers broach shanks through the bronze casting into the automatic pull heads.
3—Machine broaching stroke pulls the five broaches down through the slots.
4—Part is unloaded.
5—Operator returns machine slide up.

After running a production number of parts, the roughing broaches are replaced with the finish broaches. Locating blocks are changed. The parts are then finish broached.


Bronze casting for brush holder. Heavy lines indicate stock to be removed
First pass. Roughing broaches have removed metal as indicated
Second Pass. Finish broaches remove remaining stock and give high quality microinch finish

ALL TYPES OF BRUSH HOLDERS CAN BE BROACHED ON VERTICAL OR HORIZONTAL MACHINES

Every type of brush holder can be produced faster and more economically by broaching. **A multitude of other metal removal operations** can also profit from the cost-cutting advantages of broaching.

Would you like to find out how broaching can save you money? Ask American. You can rely on their recommendations since they provide a **complete** broaching service and offer a wide range of broaching machines. Many of the nation's largest users depend upon American equipment. Send a sample part or blueprint, plus hourly requirements, to American's engineers. No obligation, of course. Please address Department A.

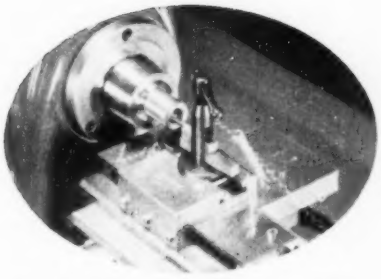
American BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

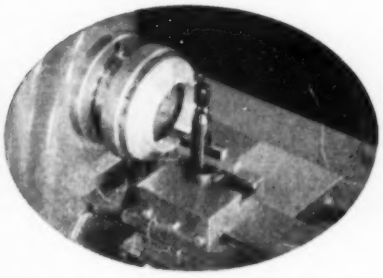
HARDINGE
ELMIRA, N.Y.

HIGH SPEED PRECISION LATHE

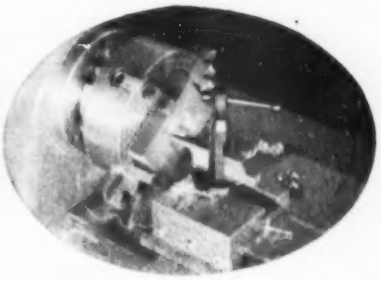
Correct Size - High Speed - Precision Results



Collet Work — The right machine for collet work of one-inch or less diameter.



Step Chuck Work — For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".



Jaw Chuck Work—Integral mount, universal or independent, for extra accuracy. Capacity to 5".

SPECIFICATIONS:
1" Collet Capacity
9" Swing
17" Center Distance
8 Speeds to 4000 rpm.

The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV59 High Speed Precision Lathe.

Correct size of the machine in relation to work saves loss from under-capacity production on larger lathes. High spindle speeds, up to 4000 r.p.m., permit full capacity cutting and excellent finish. Sustained accuracy and ease of operation assure precision results.

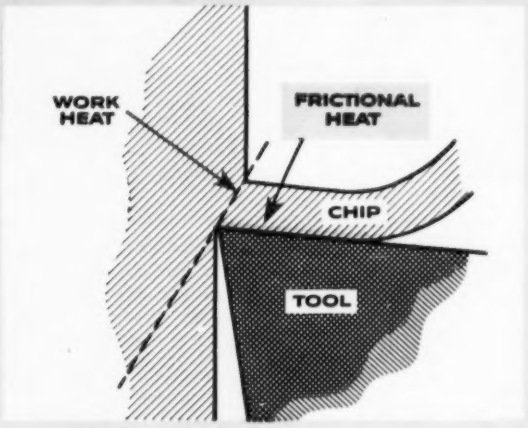
Send for Free illustrated Bulletin DV 59

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

JOHNSON'S WAX-COOL CUTS 2 KINDS OF HEAT!

The only coolant that effectively attacks *frictional* heat as well as *work* heat



Because of the greater lubricity of wax and its polar attraction for metal, Wax-Cool is the first coolant to greatly reduce frictional heat at the tool-chip interface. Wax-Cool also has the heat carry-off properties of ordinary coolants—to check work heat generated in the shearing zone.

Because Wax-Cool is the only water-soluble coolant that provides real lubrication between tool and chip, it has these advantages over other coolants:

1. **WAX-COOL** stays with tools and material even under high heat and pressure.
2. **WAX-COOL** prevents chip weld because work runs cooler.
3. **WAX-COOL** effectively minimizes *frictional* heat, which is by far the principal source of heat.

Here is proof!

Parts of a stud driving gun made of #4140 annealed alloy steel. Both parts machined on same turret lathe. Smooth finish shown at left resulted from Wax-Cool's greater lubricity. Rough, poorly finished part on right shows results obtained from ordinary coolant.

Here are Wax-Cool's other benefits:

- **Tool life almost doubled.**
- **Finish feed stepped up from .004 per rev. to .007 per rev.**
- **Speed increased from 300 R.P.M. to 680 R.P.M.**
- **Lubricant savings: approx. 50¢ per day.**
- **Eliminated problem of handling hot chips.**

A test is your best proof

In your own shop, Johnson's Wax-Cool can show you savings in tools and time plus performance standards you never believed possible. Call your local Johnson industrial distributor, or write to:

INDUSTRIAL PRODUCTS DEPT. AM7
S. C. JOHNSON & SON, INC., RACINE, WISCONSIN

Ask about Wax-Cut—*wax-type cutting oil for automatic screw machines, gear cutting machines, etc.*

Ask about Wax-Draw—*wax lubricant for drawing and forming all types of metals.*

A product of Johnson's Wax Research

If you're in the market for special machines or special tooling...

Kearney & Trecker Special Machinery Division—an old hand in the business—has a brand new plant and greatly expanded facilities to build the big or small special equipment you need

THOUGH we've designed and built up to $3,000,000 worth of special machinery annually . . . have been in the field since 1898 . . . we've never publicized the fact till recently. Limited production facilities prevented taking additional orders.

But now we have a new plant built exclusively to produce special machines, special tooling and special adaptations of standard equipment. This plant, with approximately 200,000 sq. ft. of floor space, is equipped with more than $2,500,000 worth of the very latest tools and equipment. It's at your service.

We've worked with the best of them

In practically every industry . . . automotive, shoe machinery, aviation, etc. . . . there have been many installations of Kearney & Trecker special machines. These machines were custom-built to solve unusual metalworking problems. They provide extremely high production even with exacting dimensional accuracy and fine surface finish requirements.

We're staffed with engineers who have learned the business from the ground up

Our Special Machinery Division engineering section has almost 100 widely-experienced design, project and production engineers. These men are up-to-the-minute on the latest developments in applied mechanics, hydraulics, electronics, metallurgy and allied fields. They know exactly how to utilize these advances in the design and construction of outstanding special machine tools. In addition, it has a full complement of experienced machinists and mechanics needed for special machine construction.

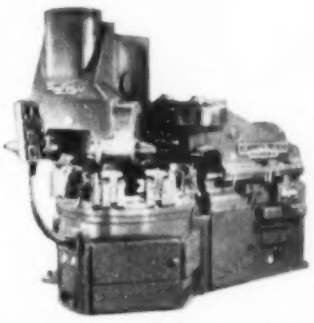
Every special machine is backed by the entire Kearney & Trecker organization

The Special Machinery Division is an integral part of Kearney & Trecker, a corporation that does an annual business in excess of $25,000,000. Every product, every commitment we make, is fully backed by our reputation for quality, cooperation and ability to live up to promises. Every machine is designed, then built, to your specific requirements with ample reserve for emergencies.

We invite your inquiry

We'll be glad to provide you with any information we can . . . including sample machine specification sheets on typical installations, a brochure covering the expanded facilities of our Special Machinery Division, and details on our Customer Engineering Service. Furthermore, if you have special production machinery problems, have one of our senior Project Engineers analyze them, without obligation, of course.

Write, wire or phone the Special Machinery Division, Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



We've built special machines or adaptations of standard equipment for practically every industry. Here is a photo of a three-station rotary indexing machine we designed and built for a major automotive manufacturer.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

Stops tarnish on copper alloy jobs . . .

● Sciaky Brothers Inc., Chicago manufacturers of spot welding equipment, were having trouble obtaining a suitable finish on certain copper alloy parts. After they were machined, parts frequently had to be processed to remove stain or tarnish. This took time and labor and cut down production.

Upon the advice of a Standard Oil cutting oil specialist, officials of this company put a STANICUT Cutting Oil to work on the troublesome copper alloy machining jobs. It was the end for tarnish troubles. On a wide variety of operations employing many different copper alloys, STANICUT has provided both superior finish and excellent tool life. Of further importance to this company, STANICUT has been used with success on other jobs and, today, is employed for all operations requiring a cutting oil. This has eliminated the cost and trouble of stocking and using several different cutting oils.

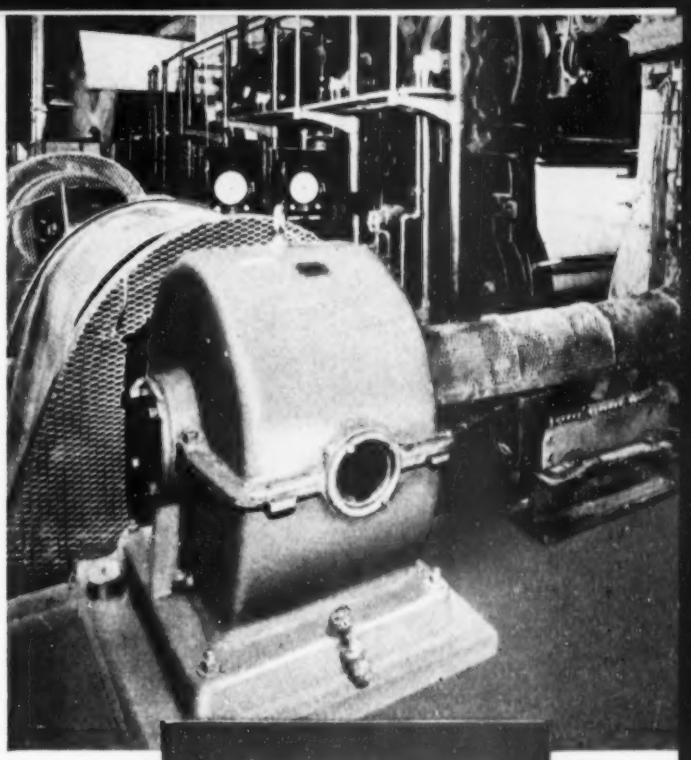
To help you get better cutting oil results, Standard Oil has a metalworking service that is unique in the Midwest. It gives you the metalworking products, the engineering service, and the supply service that fit your special operation and needs. The cutting oil specialist serving in your section of the Midwest will be glad to tell you more about this personalized service. You can reach this man easily by phoning your local Standard Oil office.

What's YOUR problem?

A. L. Seabaugh, who makes his headquarters at Standard's Chicago office, is the cutting oil specialist who recommended STANICUT Cutting Oil to operators of this midwest company and helped them solve a tarnish problem. Moreover, he has followed through on this problem to help his customer make additional cutting oil savings.

A. L. Seabaugh is one of a corps of able lubrication specialists who have headquarters in Standard offices throughout the Midwest. These men have been specially trained in Standard Oil Lubrication Engineering Schools and, in addition, have a wealth of practical experience. The specialist nearest your plant will work closely with you, giving you the help you need when you need it, to produce better cutting oil results.

You'll discover how easily and quickly you can obtain the services of this lubrication specialist by phoning your local Standard Oil office.



NEW STANOGEAR REG. U. S. PAT. OFF. **Compounds**

7 ways better for extreme-pressure lubricating jobs!

New and improved STANOGEAR Compounds have been developed to meet the requirements of the tougher extreme-pressure lubricating jobs found throughout industry, today. These outstanding products have proved their ability to provide these important advantages:

1. Higher load carrying capacity.
2. Superior retention of load carrying capacity.
3. Freedom from objectionable deposits.
4. Excellent storage stability.
5. Good water separation.
6. Anti-foaming.
7. Versatility.

The Standard lubrication specialist in your area of the Midwest can give you more information about the new STANOGEAR Compounds and help you apply them more effectively. Phone your local Standard Oil office. Or, write, Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Illinois.

STANDARD

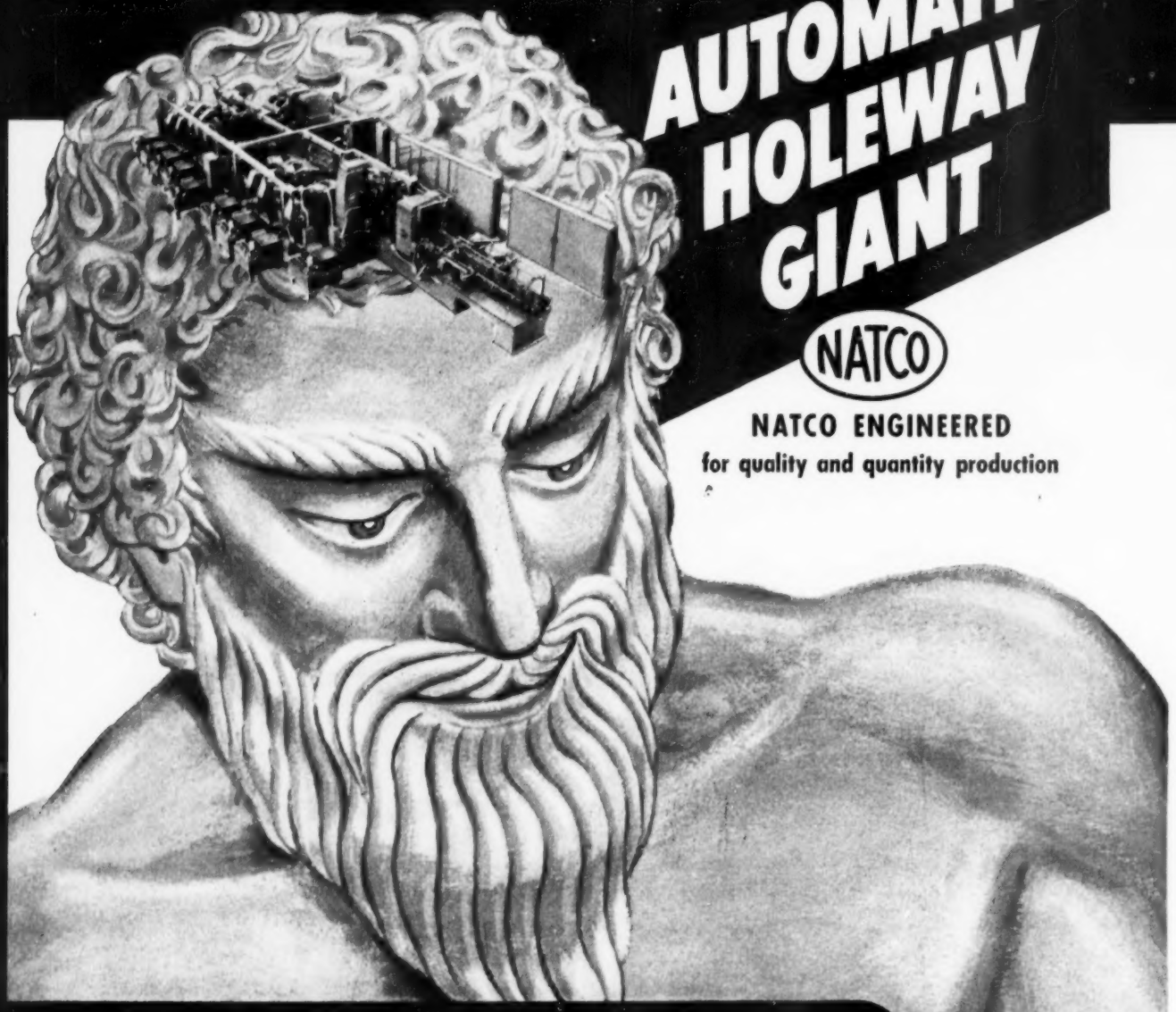
STANDARD OIL COMPANY
(INDIANA)

See how another

AUTOMATIC HOLEWAY GIANT

NATCO

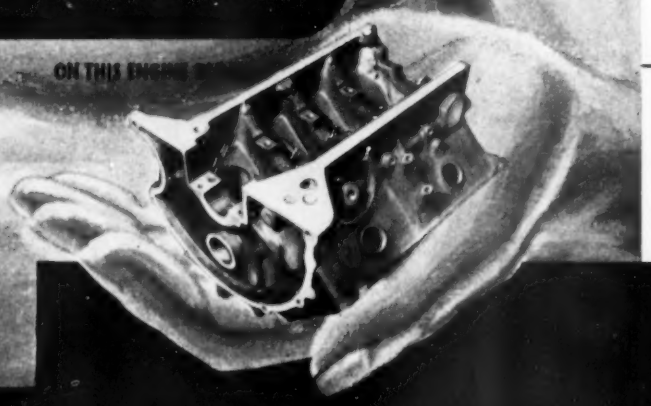
NATCO ENGINEERED
for quality and quantity production



Completes all 55 operations

at the rate of nearly 2 parts per minute

including milling, drilling, combination core drilling and chamfering, reaming, combination spot facing and chamfering, combination rough counterboring and spot facing, rotating part 180° vibrating for chip removal, and inspecting holes.



PRODUCES 111 PARTS PER HOUR and inspects its own production

OPERATIONS

STATION #1 Load 1 part

STATION #2

Right Angular Head (17° above horizontal)
- Drill 1 hole #74 to 7/16" diameter part depth.
- Drill 3 holes #73, #75 and #77 to 7/16" diameter part depth.
- Drill 1 hole #76 to 31/32" diameter part depth.

STATION #3

Right Angular Head (17° above horizontal)
- Drill 1 hole #74 to 7/16" diameter additional part depth.
- Drill 3 holes #73, #75 and #77 to 7/16" additional part depth.
- Drill 1 hole #76 to 7/16" diameter additional part depth.

STATION #4 Idle

STATION #5

Left Angular Head (45° above horizontal)
- Combination core drill and chamfer 2 holes #80 and #81 1-23/32" dia. for 1.750" ream.
- Drill 2 holes #82 and #83 to 3/8" diameter for 7/16" x 14 tap.
- Drill 1 hole #84 to 7/16" dia. through for 1/4 NPSF Thread.

Right Angular Head (45° above horizontal)
- Combination core drill and chamfer 2 holes #85 and #86 to 1-23/32" dia. for 1.750" ream.
- Drill 2 holes #87 and #88 to 3/8" diameter for 7/16" x 14 tap.

STATION #6

Left Angular Head (45° above horizontal)
- Ream 2 holes #80 and #81 to 1.750" diameter. Combination spot face and chamfer 2 holes #82 and #83 to size.

Right Angular Head (45° above horizontal)
- Ream 2 holes #85 and #86 to 1.750" diameter. Combination spot face and chamfer 2 holes #87 and #88 to size.

STATION #7 Idle

STATION #8

Left Angular Head (angle off vertical)
- Drill 1 hole #34 to 1/4" diameter 1/2 depth.

Right Angular Head (17° above horizontal)
- Combination rough counterbore for 4.94" finish diameter and spot face 1-15/16" dia. bolt boss #76.

STATION #9

Left Angular Head (angle off vertical)
- Drill 1 hole #34 to 1/4" diameter through.

Right Angular Head (17° above horizontal)
- Finish counterbore 1 hole #76 to 4.94" diameter.

STATION #10 Idle

STATION #11

Right Angular Head (17° above horizontal)
- Drill 4 holes #73, #74, #75 and #77 to 11/32" diameter additional part depth.
- Drill 1 hole #76 to 11/32" diameter additional part depth.
- Drill 1 hole #78 to 11/16" diameter .24" deep.

STATION #12

Right Angular Head (17° above horizontal)
- Drill 4 holes #73, #74, #75 and #77 to 11/32" diameter additional part depth.
- Drill 1 hole #76 to 11/32" diameter additional part depth.
- Drill 1 hole #78 to 9/16" diameter .46" depth.

STATION #13 Idle

STATION #14

Right Angular Head (17° above horizontal)
- Drill 4 holes #73, #74, #75 and #77 to 11/32" diameter to depth.
- Drill 1 hole #76 to 11/32" diameter to depth.

STATION #15

Right Vertical Head
- Mill 4" dia. seat around hole for oil breather tube.

STATION #16 Idle

STATION #17
- Rotate part 180°, vibrate while rotating from pan face up to pan face down front end leading.

STATION #18

Left Side (17° below horizontal).
- Inspect holes to be tapped for drill through and depth 5 holes #73 to #77 incl. (45° below horizontal).
- Inspect holes to be tapped for drill through and depth—2 holes #87 and #88.

Right Side (45° below horizontal)
- Inspect holes to be tapped for drill through and depth 3 holes #82, #83 and #84.

STATION #19 Unload
- Oil pan face down front end leading.

Call a Natco Field Engineer

to help you solve your problems in Drilling, Boring, Facing and Tapping.

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

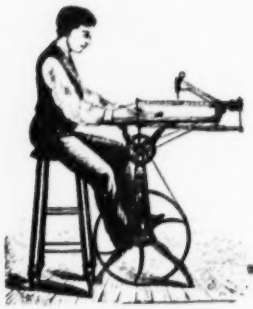
Branch Offices

1809 Engineering Bldg., CHICAGO • 409 New Center Bldg., DETROIT
1807 Elmwood Ave., BUFFALO • 2902 Commerce Bldg., NEW YORK CITY

80 YEARS OF PROGRESS

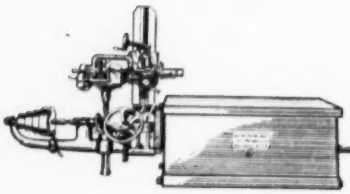
at W. F. & JOHN BARNES

Presented here are a few of the milestones in machine tool building which, over the years, have helped industries achieve the goal of producing more and more goods for more and more people at a lower cost. In effect, the application of these early Barnes Machines trace the technological advancement in machining methods. With this background, we are today better able to serve your current and future needs.

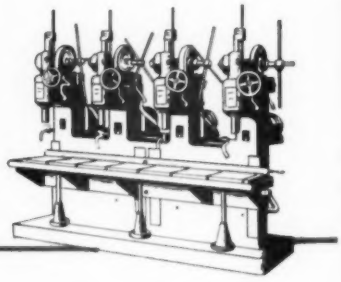


1872 Foot-Powered Scroll Saw — the first Barnes-built industrial machine.

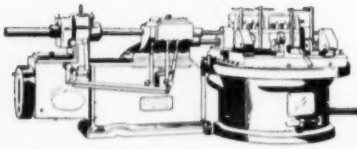
1885 Open Frame Single Spindle Drill Press — belt-driven and hand feed.



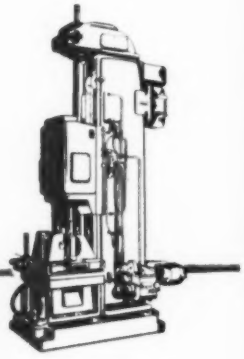
1900 Barnes Horizontal Radial Drill — used for automobile crankcase drilling and boring work.



1920 Single Purpose 20" Barnes Production Gang Driller.



1925 Barnes Single Head Screw Feed Boring Machine — equipped with rotating table.

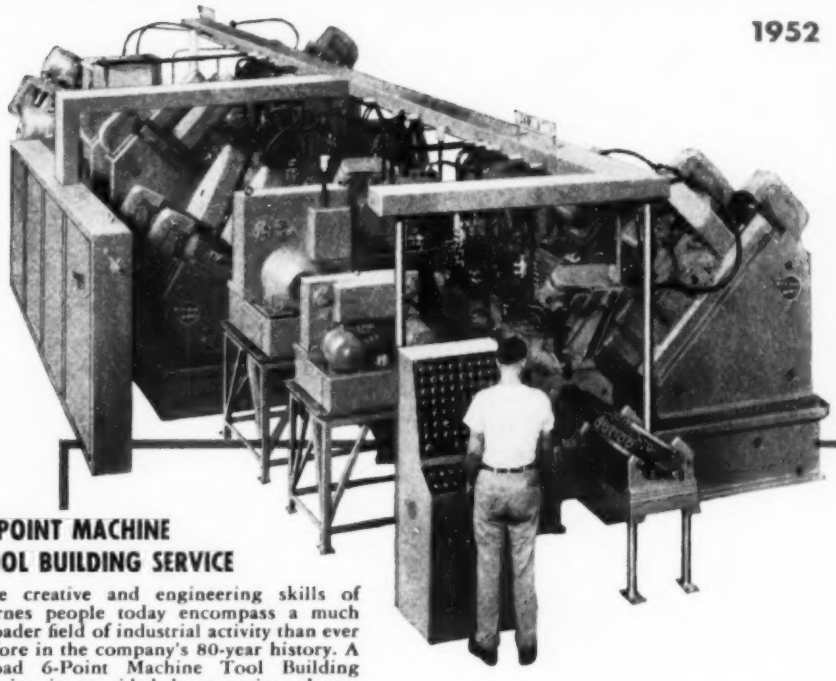


1930 Barnes Special Vertical Single Point Boring and Reaming Machine — equipped with hydraulic feed unit.

W. F. & JOHN BARNES COMPANY

MULTIPLE SPINDLE DRILLING • BORING • TAPPING MACHINES

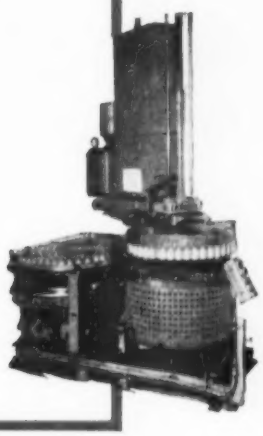
in Machine Tool Building



1952

One of the latest Barnes Automatic 13-Station Progress-Thru Machines for drilling, reaming, chamfering and tapping V-8 automobile engine cylinder heads. Machine is equipped with 82 spindles and handles 78 machining operations at a gross production rate of 125 pieces per hour.

(Below) An Automatic Retort Loading Machine is one of a variety of special equipment, such as glass handling machines, can unloaders, carton uncasers and special conveyors designed and currently built at Barnes for food, chemical and beverage industries.



6-POINT MACHINE TOOL BUILDING SERVICE

The creative and engineering skills of Barnes people today encompass a much broader field of industrial activity than ever before in the company's 80-year history. A broad 6-Point Machine Tool Building Service is provided by experienced mechanical, hydraulic, electrical, process, tool and fixture engineers working together toward a common goal. As a result, you get the benefit of a coordinated effort that saves time and trouble.

BARNES SPECIAL MACHINE TOOL BUILDING SERVICE INCLUDES . . .

1 SPECIALIZED MANUFACTURING FACILITIES—80 year background, large well equipped plant efficiently tooled to produce high production machines.

2 SPECIAL HYDRAULIC EQUIPMENT—designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.

3 SPECIAL GAUGES, FIXTURES, TOOLS—designed for each individual machining problem, assure accuracy of operation at high production speeds.

4 SPECIAL ELECTRICAL EQUIPMENT and CONTROLS—individually designed and built for maximum safety and ease of control with circuits that assure the most dependable coordination of all machine functions.

5 SPECIAL HANDLING AND CONVEYOR EQUIPMENT—designed and built to reduce work handling, effect maximum safety and efficiency.

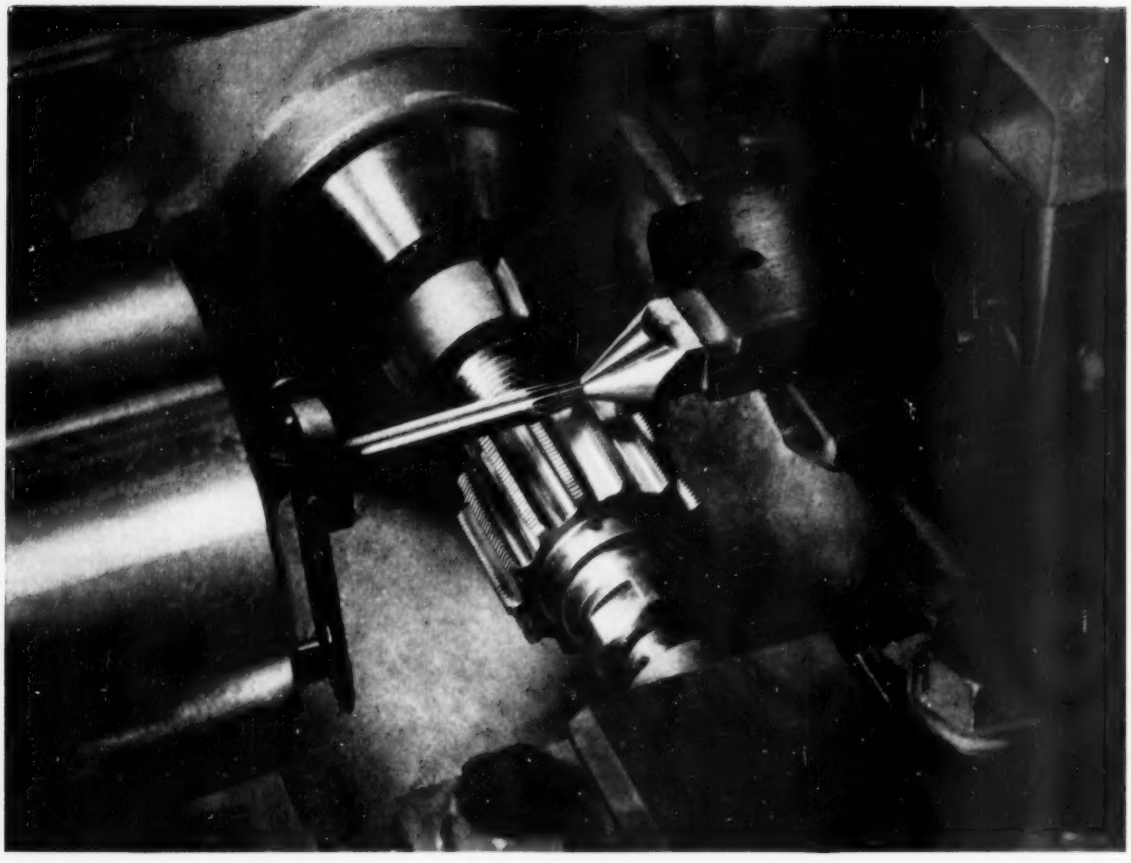
6 COORDINATED DESIGN AND ENGINEERING—Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.

Write for Free Data

Ask for free booklet "Coordinated Machine Engineering" describing the scope of Barnes machine tool building service. Illustrates and describes modern machines and mass production techniques.

314 S. WATER STREET, ROCKFORD, ILLINOIS

AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES



Consistently Better Gears

WITH CLASS AA HOBS

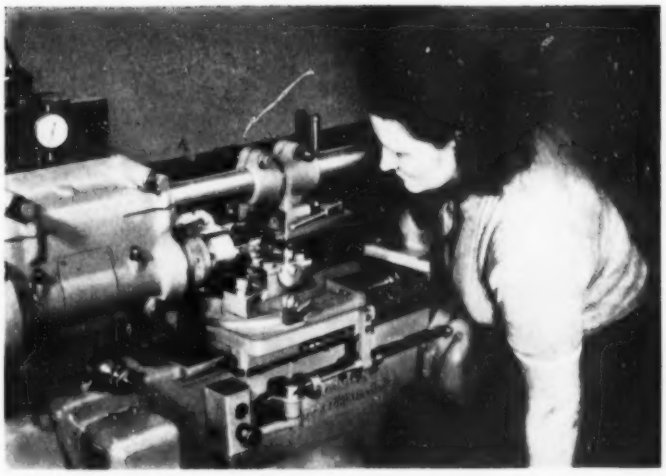
Specialists in the field of instrument gears, G-M Laboratories, Chicago, Illinois employ the latest precision techniques to assure consistent accuracy in their work. Their modern gear department is completely temperature and humidity controlled, and Precision Type Barber-Colman Hobbing Machines are used.

To produce the finest gear accuracy, this firm has standardized on the use of Class AA hobs with taper bores for their precision work. Experience has shown that Barber-Colman Precision No. 6-10 Hobbing Machines, in combination with Class AA hobs, give them the most accurate tooth form and spacing. All gears are finish hobbed, without further finishing operations. Tolerances on the pinions shown here consistently check within .0003" tooth-to-tooth composite error, and .0006" total composite error.

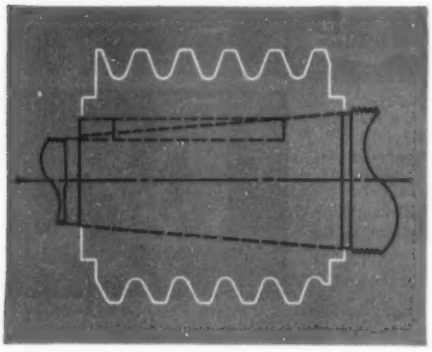
BUILDERS OF PRECISION GEAR

GREATER NUMBER OF CLOSE TOLERANCE GEARS USING CLASS AA HOBS

Although the hob is not the only factor affecting the accuracy of gears, it does have an important effect, particularly upon the profile of the gear tooth. Class AA hobs are made to consistently closer tolerances than any other hobs, and have proved themselves in actual production for many years. Performance records show that, per sharpening, Class AA hobs produce more gears with close tolerances than any other hobs.



TAPER BORES RECOMMENDED . . .



Class AA hobs are recommended for the utmost in precision, where other conditions warrant the use of a tool of this class. This accuracy in the tool, however, may be lost if the hob is not properly mounted or trued on the machine. Because of this, Class AA hobs are recommended with taper bores. The taper makes it much easier to true hobs on the arbor where high accuracy requirements are demanded. Compared with the sliding contact on straight hole hobs, the taper provides metal-to-metal contact, eliminating the possibility of an increase in runout during the cutting operation. Time is also saved for the operator because the hob will run as true as the spindle.

Production-line accuracy in all metal cutting operations is constantly approaching closer limits. Gear hobbing is perhaps the outstanding example. When you have gear tooth problems be sure to ask Barber-Colman Hobbing Engineers to work with you. Their long experience in gear cutting is available to you without cost or obilgation.

Write for a copy of Hobbing Notes — *"Hobbing Accurate Gears"*

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

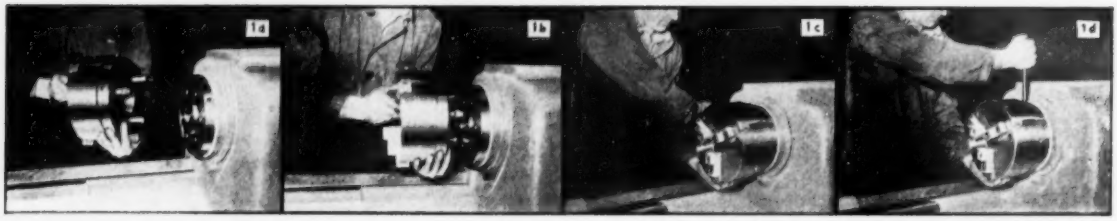
Barber-Colman Company

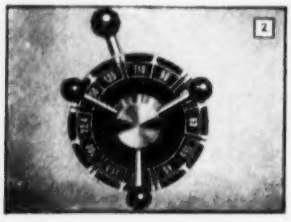
GENERAL OFFICES AND PLANT, 717 ROCK STREET, ROCKFORD, ILLINOIS

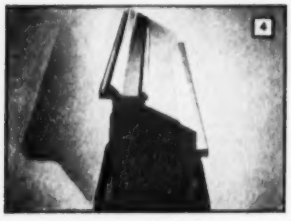
HOBS AND MACHINES SINCE 1911

6 Advantages of the GOLIATH
High Speed Lathe

- which have brought it so quickly into high demand







1 a - d **Quick chucking device** (German Patent)
Short-tapered spindle nose acc. to DIN 812 allows change of face plate, chuck, dog plate etc. in far less time than is required in the case of any other lathe. It will take you no longer than you need to read these lines . . . 6 to 10 seconds at most.

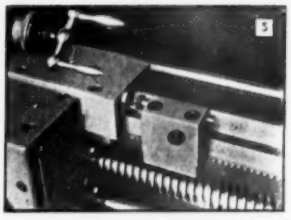
2 **Control of 12 spindle speeds trough only two levers**
You need but operate a single cross handle and the back gear lever, to control 12 spindle speeds, row I: 24 - 1000 r.p.m., or row II: 32 - 1400 r.p.m.

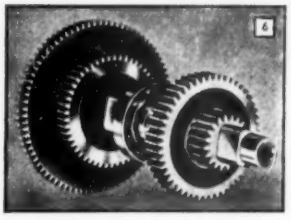
3 **Control of all threads and feeds through a single control block**
No tumbler yoke. All gears hardened and ground and with oil bath lubrication. Coarse thread 1:8. Multiple thread cutting device.

4 **Inverted V-way bed**
Novel bed construction. Chip slide to the rear. Bed reinforced through diagonal ribs. Full-length box type support. Protected V-ways.

5 **Automatic apron release**
Release accuracy of .0004" guaranteed by patented drop-worm device. No recoiling of carriage.

6 **All sliding wheels and shafts with (K) Profile**
For more than 10 years we have been using the patented triangle (K) profile instead of hexagon spline shafts. This offers additional safety, as displacing of wheels is impossible while machine is running, and extends lifetime of lathe.



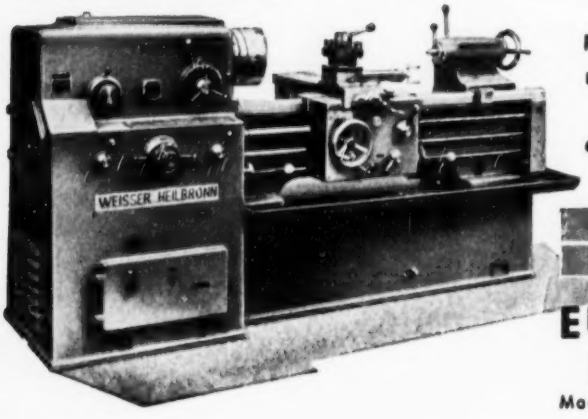


Specifications:

Max. swing over bed	18½" or 19¾"
Max. swing over cross slide	8¼" or 9⅞"
Distance between centers	30" / 40" / 60"
Motor	7,5 or 10 H.P.

Advise and service through our authorized expert agents.
Write for English prospectus No. 2132 to be sent to you without obligation.

Always Best! Always Weisser!



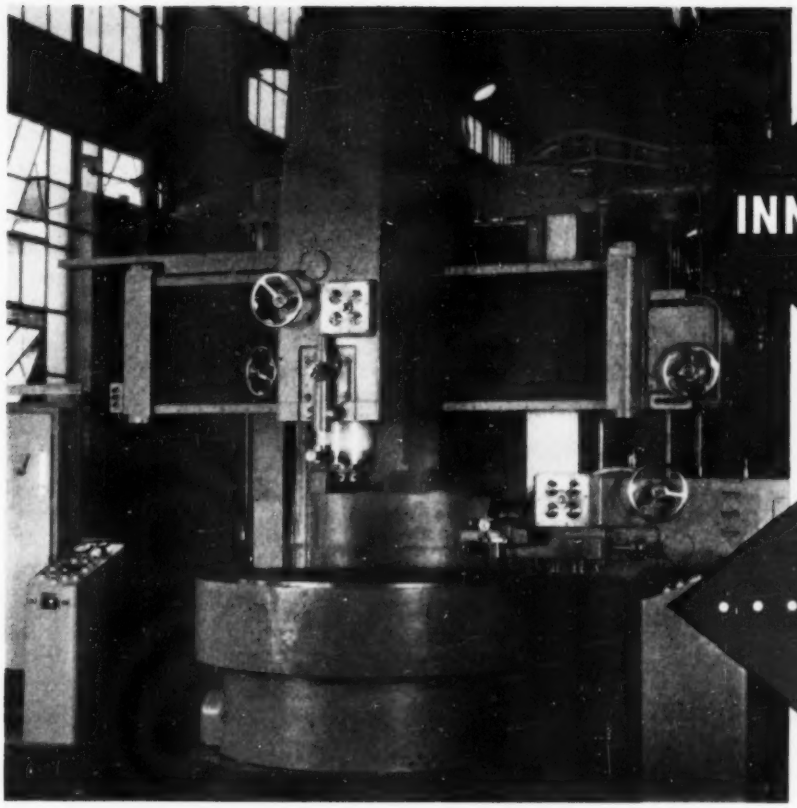
Representatives and Service:

USA: Guthery Machine Tool Corp., 130 West 42nd Street, New York 36, N. Y. Telephone: CHickering 4-2820.

Canada: Transocean Machine Company Inc., 267 Dunbar Avenue, Montreal 16, P.Q. Telephone: REgent 3-5373

WEISSER HEILBRONN

EUGEN WEISSER & CO. KG.
HEILBRONN / NECKAR (Germany)
Machine Tool Manufacturer – Salzstrasse 79/83 and 128/130



AN INNOVATION *in*

VERTICAL CHUCKING GRINDING MACHINES

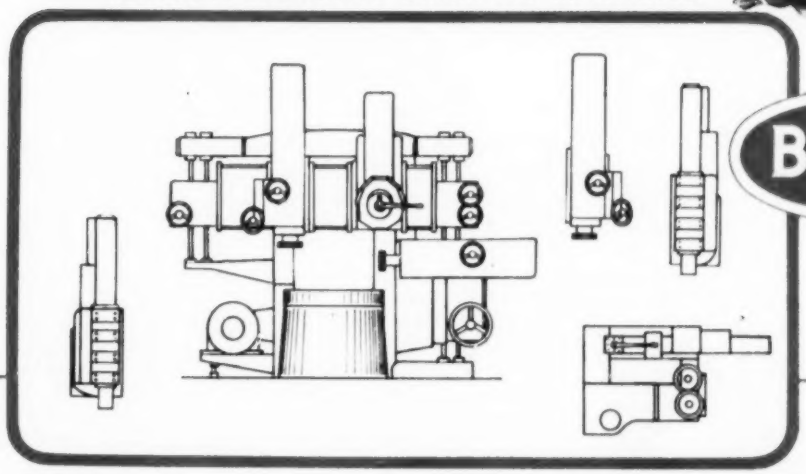
Your Grinding Jobs finished . . . Keep the Machine Paying Its Way . . .

NOW . . .
Practical Versatility

BY . . .
Grinding, Boring, Facing or Turning with several head combinations available.

ASSURED
Sufficient horsepower for regular machining cuts first . . . Grinding work next . . . on the SAME machine.

POSSIBLE HEAD COMBINATIONS on BULLARD VERTICAL CHUCKING GRINDING MACHINES

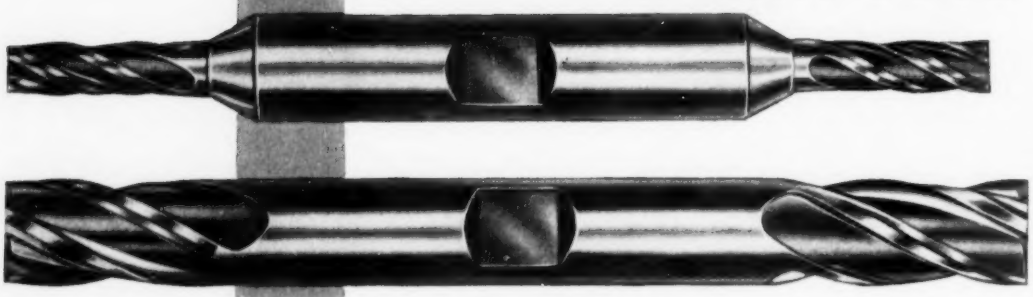


THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

Another Quality Engineered

ATRAX TOOL



Double-End Carbide End Mills
Precision Machine Ground-from-the-Solid

1. Shanks flatted for set screw.
2. Cutter 1/8" to 9/32" diameter of brazed inserted type construction—prevents loosening or separating from steel body, a hazard of conventional built brazed construction.
3. Cutter 5/16" to 1/2" diameter of solid carbide throughout —adding rigidity and strength for extra heavy cuts.
4. Backed by the Atrax quality reputation— the finest carbide tools of this type.
5. Available in 2 and 4 Spiral Flutes.

Representatives and Distributors in principal cities in United States and Canada. Write for name of representative in your area.

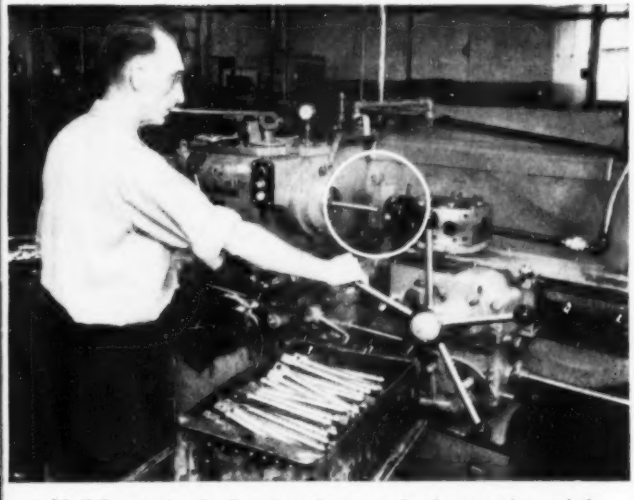
Send for complete catalog NOW!

THE ATRAX COMPANY

NEWINGTON 11, CONNECTICUT

WHY THIS NEW SELF-OPENING HEAD

Rolls threads more accurately • stronger • smoother... and cheaper than any other tool



¼" Self-Opening head rolling piece shown on a hand operated turret lathe.

This "Fette" patent chipless thread forming method is *different*—material rolled flows in an axial direction so that the thread is generated ahead of the rolls. Flow to full depth of thread avoids broken grain structure and cratering crest; surfaces are densified, smoother, more wear resistant. Part shown is unretouched.

It works like this—annular grooved rolls are positioned in plates in the head and only the rolls are changed for different thread forms or pitches. Fine adjustment is provided for exacting diameters. Rolling speeds are equivalent to turning speeds.

Self-opening heads, with simple quick-acting gear mechanism, frees the work instantly at proper thread length; no lead screw or follow up cam required.

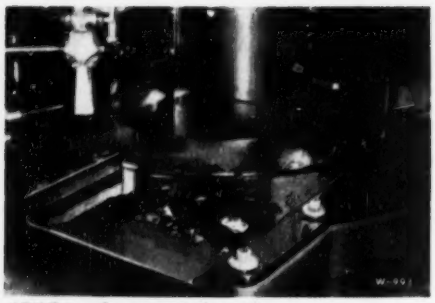
These National Acme (Fette patent) Heads accommodate all standard parallel thread forms and are made in both revolving and non-revolving types suited to horizontal and vertical machines.

Bulletin FRH-53 gives full data

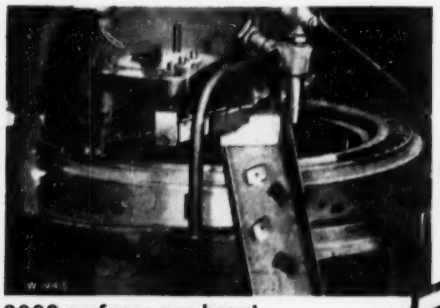
Manufactured and Sold in U. S. A. only by

The NATIONAL ACME COMPANY

170 East 131st Street • Cleveland 8, Ohio, U.S.A.

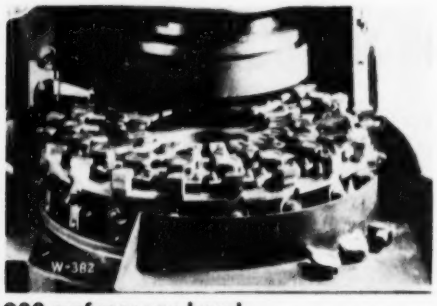


4360 surfaces per hour!

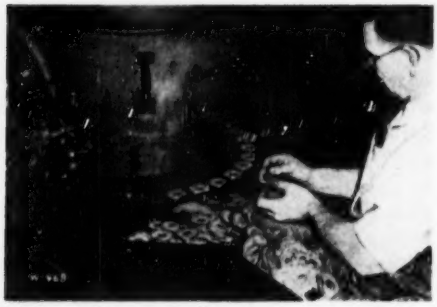


2000 surfaces per hour!

940 surfaces per hour!



900 surfaces per hour!



1400 surfaces per hour!

FIELD REPORT:

... a Blanchard No. 16-A Surface Grinder saved them $39,000 in 2½ years! (cost approx. $12,500) Their order follows for a Blanchard No. 16-A2!

Here's proof of performance and proof of satisfaction, yet typical of what users expect *and get* from the Blanchard 16-A Surface Grinder. Several typical examples of production rates are shown here. Above, for instance, .003" of stock is being removed from one side of small gears to a tolerance of ±.001" *at a rate of 2100 per hour!* This machine has a 30" chuck and a Blanchard Demagnetizer.

The No. 16-A grinds continuously with a wheel that is set and automatically maintained at a fixed height above chuck face, and finishes one surface of the work to size in one pass under wheel. Operator has only to load the work on the magnetic chuck or in an automatic clamping fixture. A wheel control automatically feeds the head down to compensate for wheel wear. Unloading is usually automatic. Attachments can be supplied for demagnetizing and washing the work as it leaves the grinder. On most work, limits of ±.0005" are readily maintained.

The No. 16-A2 (not shown) has two wheels, each with automatic size control. It roughs and finishes one surface of the work in one pass through the machine.

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE CO.

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

GET OUR *Free* 6-PAGE FOLDER

See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. This attractively printed 8½ x 11" 6-page folder is punched for ring-binder use. You'll want to keep it handy for frequent reference. It contains 23 pictures of Small Gears, plant views, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!

Bears for Punishment

G.S.

Fractional Horsepower Gears

G. S. Gears can take *a lot of punishment!* They keep on serving smoothly, quietly, dependably long after ordinary Gears have broken down under the strain. Selection of correct materials . . extreme accuracy and above all *unvarying UNIFORMITY* in every one of a thousand gears or more, are some of the reasons for the finer quality of the Gears we make. If you too want small gears that can take it . . that will cut assembly downtime and improve your product, take advantage now of our 35 years of specializing in making better Fractional Horsepower Gears exclusively!

FRACTIONAL HORSEPOWER GEARING

GS

GEAR

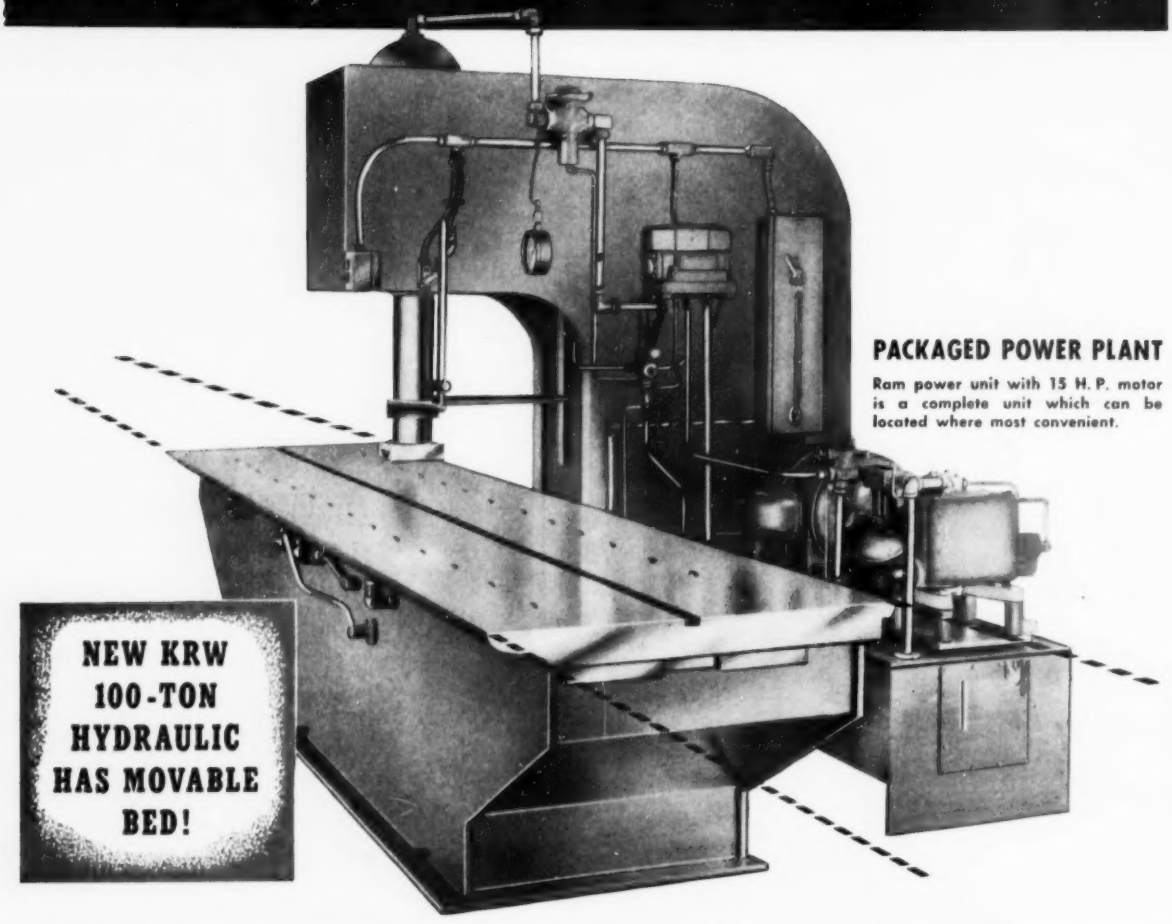
Specialties, Inc.

2635 WEST MEDILL AVENUE
CHICAGO 47, ILLINOIS

SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS
WORM GEARING • RACKS • THREAD GRINDING

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS
OF FRACTIONAL HORSEPOWER GEARING

NEW PRESS BRINGS THE WORK TO YOU!



PACKAGED POWER PLANT

Ram power unit with 15 H. P. motor is a complete unit which can be located where most convenient.

NEW KRW 100-TON HYDRAULIC HAS MOVABLE BED!

Here's KRW's newest time-saver! It's a 100-ton Hydraulic Press with an extra-long 16 foot bed that moves more than 3 feet in either direction. Now being used for important straightening work by some of America's largest manufacturers of airplane forgings. Due to the extra-long movable bed, straightening work on large pieces can be accomplished with greater facility and speed. Ideal for manufacturers and fabricators of extra-long parts that require straightening work. Press bed has independent motor drive. Hydraulic motor doesn't have to be running to move the press bed back and forth.

This new KRW press has a unique load-control feature. An applied ram load can be maintained at any pressure setting from 10 to 100 tons without holding manually controlled lever at applied position. Operator can bring ram load to desired tonnage and remove hand from control lever. Lever automatically returns to neutral but applied load will be retained until manually controlled lever is moved to reverse position for lifting ram. This feature saves time on straightening jobs where it is necessary to hold a given pressure for periods of time.

KRW also makes a full line of one, two and three cylinder Hydraulic Presses; hand, air or motor driven; 25-150 ton capacities. Write for details and prices on this or any KRW Hydraulic to Dep't. 11.

SPECIFICATIONS

CONSTRUCTION Cylinder—chrome-nickel-molybdenum steel; C-frame and bed, weldment fabrication; Table, steel.

TABLE CONTROL Separate push buttons for right and left movement. Table stops when manually applied push button is released.

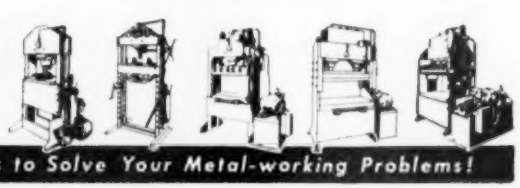
SAFETY PROVISIONS Electrical System—disconnect switches, automatic and manual.

Hydraulic System—pressure relief valves eliminate danger of overload in any part of the Hydraulic circuit.

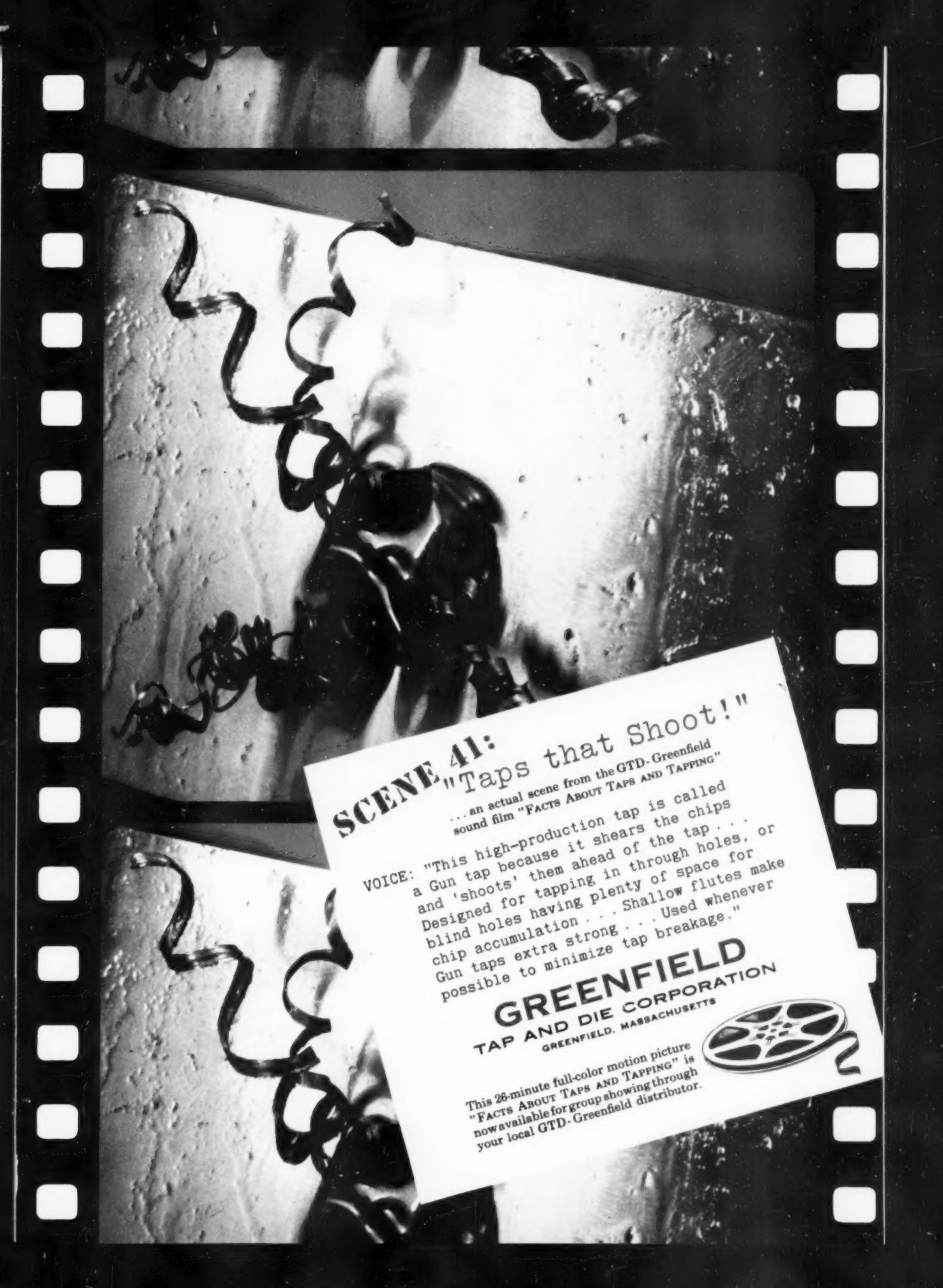
Table and Ram travel is limited by safety switches. Manually adjustable stop limits up-travel of ram.

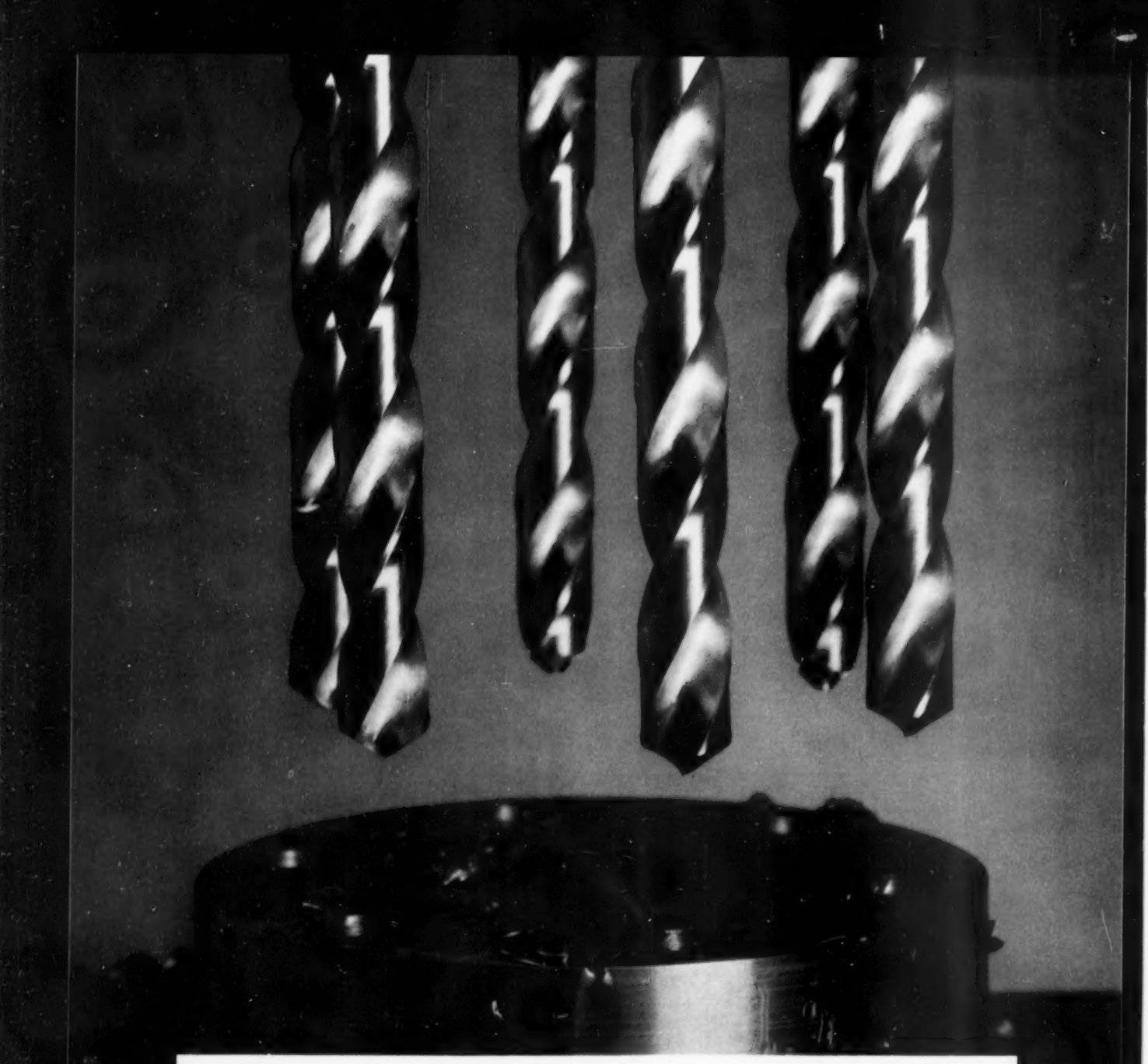
K·R·WILSON

215 MAIN ST., BUFFALO 3, N. Y.



Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!


SCENE 41:
"Taps that Shoot!"
... an actual scene from the GTD-Greenfield sound film "FACTS ABOUT TAPS AND TAPPING"
VOICE: "This high-production tap is called a Gun tap because it shears the chips and 'shoots' them ahead of the tap . . . Designed for tapping in through holes, or blind holes having plenty of space for chip accumulation . . . Shallow flutes make Gun taps extra strong . . . Used whenever possible to minimize tap breakage."
GREENFIELD
TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS
This 26-minute full-color motion picture "FACTS ABOUT TAPS AND TAPPING" is now available for group showing through your local GTD-Greenfield distributor.



WHY POLISHED FLUTES?

One of the functions of drill flutes is, "to permit passage of chips", according to the official definition of drill terms.

As an aid to this function in sizes over one-half inch, all GTD-AMPCO Drills, both catalog listed and special, are regularly furnished with polished flutes.

The smoother surface of polished flutes results in better chip slippage, lessens friction heat and tends to lower power consumption.

You can have the advantages of polished flutes at no extra cost by specifying GTD-AMPCO Drills.

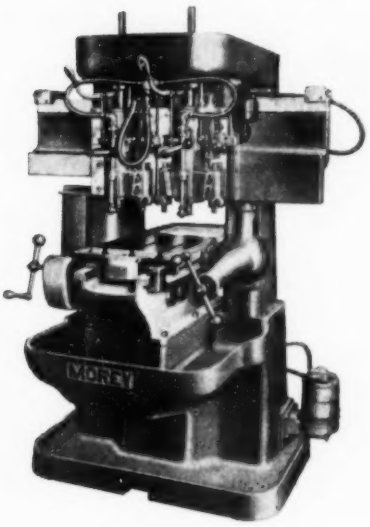
AMPCO TWIST DRILL DIVISION

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASS.

Progressive Design
for Greater Production . . .

MOREY MACHINE TOOLS



MOREY NO. 12-M VERTICAL PROFILER and MILLER

Designed for the economical duplication of parts requiring accurate interchangeability.

- Balanced crossrail
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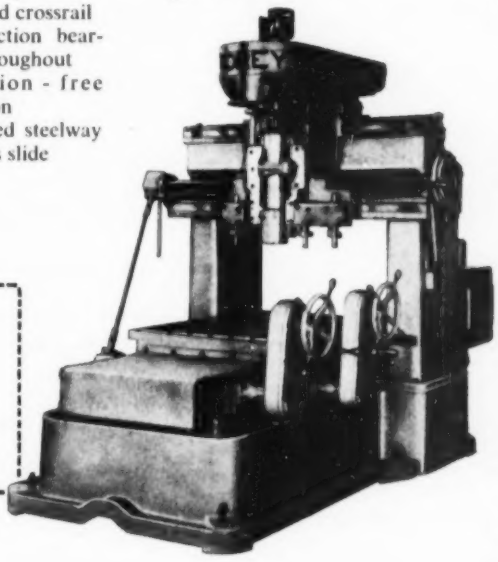
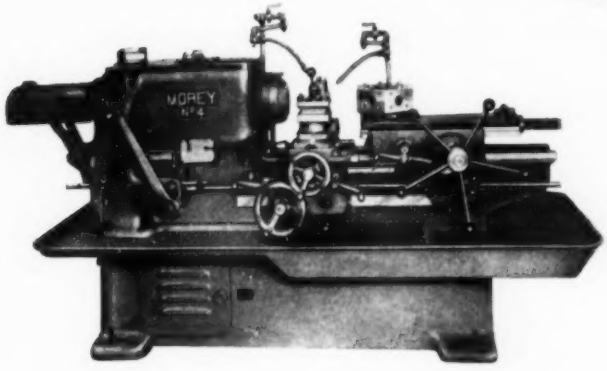


MOREY NO. 40-M "AEROFRAME" PROFILER and MILLER

Ideal for milling and profiling irregular and complicated precision machine parts.



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No. 3 1½" x 10"
No. 4 2" x 12" (Illustrated)
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How's Your Metalworking IQ?

The questions below are important ones to every metalworking production executive concerned with the successful planning of his company's future. There are many more like them which, when answered, can help you do a sounder, more progressive production-planning job in the competitive months and years ahead. But for a starter, try your luck with the ten questions below.

1. What formula, for determining when a machinery replacement program can be successfully launched, is now most widely known in the Metalworking Industry?
2. To what extent has Metalworking expanded its production since 1949?
3. How can you compare the age of the machine tools in your shops with the average throughout Metalworking, or in your specific industry and geographical area?
4. By what method have many metalworking production executives successfully gained approval for extensive machinery and equipment replacement programs?
5. What recent developments in broaching are particularly significant?
6. What basic revolutions in press design are resulting from the heavy-press program?
7. In general, are the major production machines now in use by Metalworking more modern than those of four years ago?
8. Who has had, to date, the broadest experience with titanium as a structural material, and how bright is its future in this field?
9. In the welding of what metal has the inert gas-shielded arc recently been successfully applied?
10. Does anyone know the answers to all of these questions?

1. The MAPI Formula. There are, however, a number of other formulas which have successfully proved their worth. Many of them will be compared for you in *American Machinist's* PRODUCTION PLANBOOK for Metalworking Issue, coming your way in Mid-November. 2. As of June, by 81%, according to the *American Machinist* Index of Metalworking Production. You will find much more on this important subject in the PRODUCTION PLANBOOK. 3. By reference to the *American Machinist* 1953 Inventory of Metalworking Production Equipment, which will be an outstanding feature of the 1954 PRODUCTION PLANBOOK. 4. By showing how much such a program would be able to reduce production costs. The PRODUCTION PLANBOOK will bring you many outstanding case histories on such successful programs, complete with all pertinent replacement costs and actual production savings. 5. Two of the most important are higher surface speeds and longer strokes. You will find much more on this significant subject in the PRODUCTION PLANBOOK. 6. Greater working clearances and higher capacities among others. You won't want to miss the PRODUCTION PLANBOOK's careful analysis of the future place of heavy presses in metalworking production. 7. Probably yes, in view of Metalworking's large expenditures for new machinery and equipment since the war. No definite answer to this question will be available, however, until publication of our 1953 Inventory in the PRODUCTION PLANBOOK. 8. The Air Force and Army Ordnance have had most of this experience. To date, results point toward a favorable future for titanium as a structural material. 9. Stainless steel. For all the important facts on this subject, don't miss the 1954 PRODUCTION PLANBOOK. 10. No, nobody knows now. But you will find the answers to these, and thousands of other questions about your industry, in the 1954 PRODUCTION PLANBOOK for Metalworking. Some of the invaluable help and ideas you can expect from this issue are briefly described on the next page.

IN NOVEMBER, answers to thousands of important questions about your industry are coming your way

Never until now has any metalworking magazine tackled the job of bringing you, in one issue, as much useful information as *American Machinist's* 1954 PRODUCTION PLANBOOK will offer.

Headlined by the Seventh of *American Machinist's* famous Inventories of Metalworking Production Equipment, the PRODUCTION PLANBOOK will also bring you:

THE PRODUCTION OUTLOOK. All the basic facts you need on Metalworking's recent accomplishments, and prospects for the future.

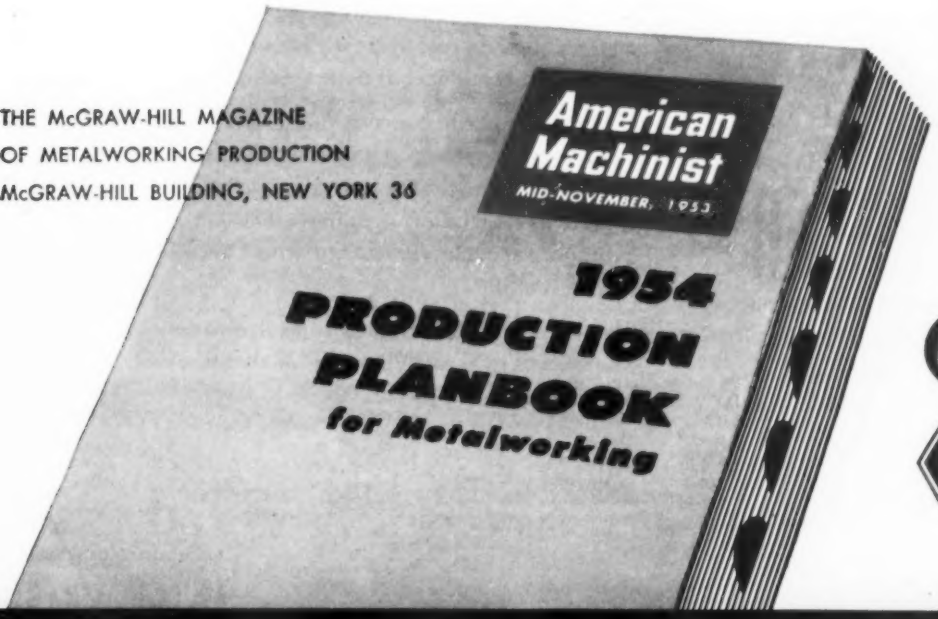
HOW TO PLAN A SOUND APPROACH TO MACHINERY AND EQUIPMENT REPLACEMENT. An analytical examination of the MAPI Formula, and many other tried and successful approaches to the problem of knowing *when* your production machinery and equipment can most advantageously be replaced.

CASE HISTORIES OF SUCCESSFUL MACHINERY AND EQUIPMENT REPLACEMENT PROGRAMS. An invaluable opportunity to study the most significant data our editors have been able to accumulate in a year of industry-wide investigation.

Here, at your fingertips, you will now have the answers to so many questions of immediate and long-range significance that you will use the 1954 PRODUCTION PLANBOOK for years to come. And perhaps the best news of all is this: there will be a *new* PRODUCTION PLANBOOK each November, to add its wealth of help to what has come your way in each previous year's issue. As an *American Machinist* subscriber, the 1954 PRODUCTION PLANBOOK, and each one to follow, is *yours* as part of your regular *American Machinist* subscription.

Now, more than ever, *American Machinist* is your most useful and informative guide to all that's new in metalworking production.

THE McGRAW-HILL MAGAZINE
OF METALWORKING PRODUCTION
McGRAW-HILL BUILDING, NEW YORK 36



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ABC

Friction surfaces need

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Since 1915—leader in the field

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Every engineer learns it early: wear is a problem whenever two surfaces slide or roll against each other. But here is a surface treatment for metals which effectively *retards* wear on iron and steel.

Parco Lubrite converts the surfaces of iron and steel parts to a non-metallic phosphate coating integral with the metal itself. The coating is oil-absorbent. Because it is nonmetallic, it prevents metal-to-metal contact during initial operation. Break-in is smooth and easy, without galling or scoring. Treatment with Parco Lubrite increases subsequent service life, too.

Parco Lubrite can help you solve your problems of wear on friction parts. Let us give you full details on the simplicity, economy and efficiency of this excellent product. Write today!

**Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

BONDERITE corrosion resistant paint base
BONDERITE and BONDERLUBE aids in cold forming of metals
PARCO COMPOUND rust resistant
PARCO LUBRITE wear resistant for friction surfaces

Flange radius control... another

Hydroforming

advantage!

Fig. 1
Flange radius before edging.

Fig. 2
Flange radius after edging.

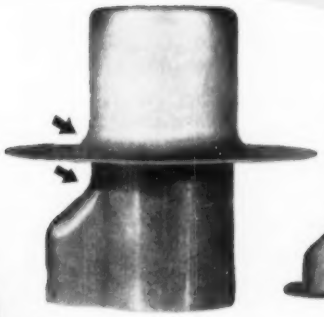

Fig. 3
Partially drawn part after first operation, is shown seated on punch used for second operation. Note large radius on part which matches angular top of projection on punch.

Fig. 4
Special cover is completed in second operation.

The Hydroforming process makes possible sharp corners and small radii—without restriking. With the Hydroform's *edging feature*, a sharp flange radius can be produced *automatically* during the forming cycle.

Edging is accomplished at the end of the forming stroke by reversing the punch a short distance while the blankholding pressure remains on the part. The material formed to the punch moves downward with the punch. The flange of the deep drawn part rests on the draw ring and cannot move. Thus the flange radius is reduced as the punch is reversed. (See Figs. 1 and 2.)

By properly controlling the forming pressure in the latter stages of the draw cycle, it is possible (depending on type and thickness of material) to produce the required flange radius without edging. It is also possible to produce abnormally large radii—advantageous in forming some parts requiring more than one operation without thinout. For example:

To form the special cover (Figs. 3 and 4), the blank was first drawn until the spout-like projection was reached and, by accurate pressure control, the large flange radius was produced which matched the angular top of the projection. Thus, with the material in proper position, the cover was readily completed in the second drawing operation.

Are you fully informed on *all* the advantages of Hydroforming? Let a Cincinnati Milling field engineer give you full details on this newest method for reducing costs on deep drawn parts production. For a description of the five sizes of Hydroform machines — 12″, 19″, 23″, 26″ and 32″ — write for your copy of Bulletin M-1759-2.

CINCINNATI Hydroform

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

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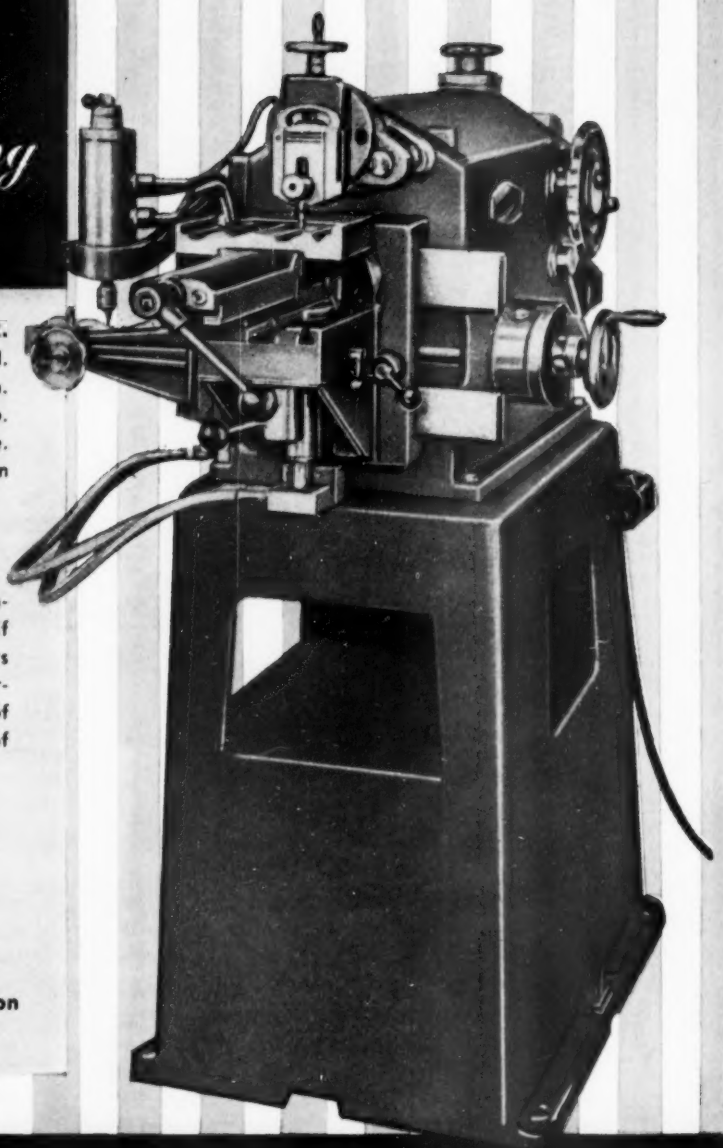
Hydraulic Copying Shaper



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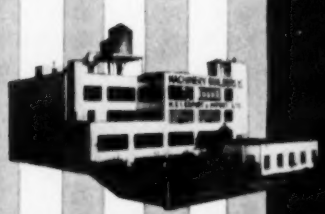

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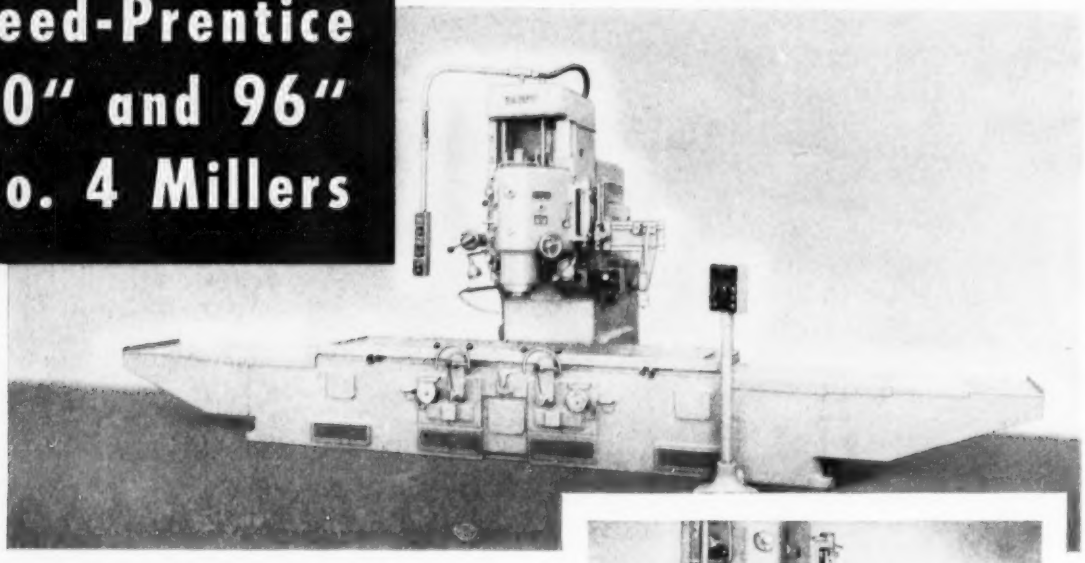
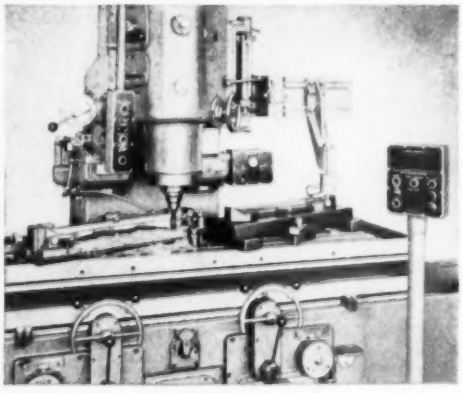
on Reed-Prentice 60" and 96" No. 4 Millers



96" No. 4 Vertical Miller with two-dimensional Contouric 3 Unit



Two-dimensional electronic contour follower system on No. 4 Miller duplicating aircraft part for Kaiser Manufacturing Company of Richmond, California.

Here's the ultimate in electronic machine control — at your fingertips! The Reed-Prentice No. 4 Vertical Miller, featuring electronic control for all feeds, provides unsurpassed accuracy in complex duplicating operations when equipped with a General Electric two or three-dimensional electronic contour follower system.

Today Reed-Prentice No. 4 Millers perform milling and profiling work for such leading manufacturers as General Motors Corp., Allis-Chalmers Mfg. Co., Chrysler Corp., Kaiser Mfg. Corp., Westinghouse Electric Corp. and National Pressure Cooker Co.

SPECIFICATIONS		#4-60"	#4-96"
Longitudinal travel of table		60"	96"
Travel of cross slide		24"	24"
Table working surface		24 x 96"	24 x 132"
Feed range		½ to 25" per minute	
Spindle speeds:	20 H.P. motor	45-1800 RPM	
	25 or 30 HP motor	90-1800 RPM	

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Buffalo . J. L. Osgood Machinery Corp.
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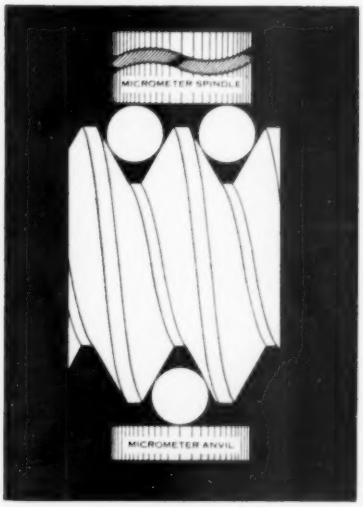
TAP-ODDITIES

Pete went to a 3-D show
Where things don't look the same.
He put on his glasses just in time
To be awfully glad he came!



Pete finds Bath Taps are true to scale
By the 3-wire system measure.
They give a Double Dollar Deal —
(3-D's we all can treasure!)

INSIST ON BATH TAPS
— PROFIT BY THEIR
PLUS — PERFORMANCE

Pitch diameter is a most important dimension of Bath Taps. The measurement made by the 3-wire system is an accurate method of standardization recommended for checking many taps.

To make this check, it is necessary that the micrometer touch all 3 wires (see illustration above). These wires should be selected of such a size that they are tangent to the thread angle at the mid-slope or point of intersection with the pitch line. Such a wire is called a "best" wire and a chart shows the proper sizes of "best" wires for each pitch.

For example — to determine the pitch diameter of a $\frac{3}{8}$"-16 NC tap, measuring .3885 over .03608 (the "best-size" wire for 16 threads per inch):

Actual measurement over wires	=	.3885
Subtract constant for "best-size" wire .03608	=	.0541
Pitch diameter of the tap	=	.3344

Bath "ground from the solid" Taps are "controlled" taps with measurements maintained to the closest tolerance. When the pitch diameter is known, subsequent lots of taps can be produced to exact size. Be sure of uniform results — use Bath Taps for Better Threads.

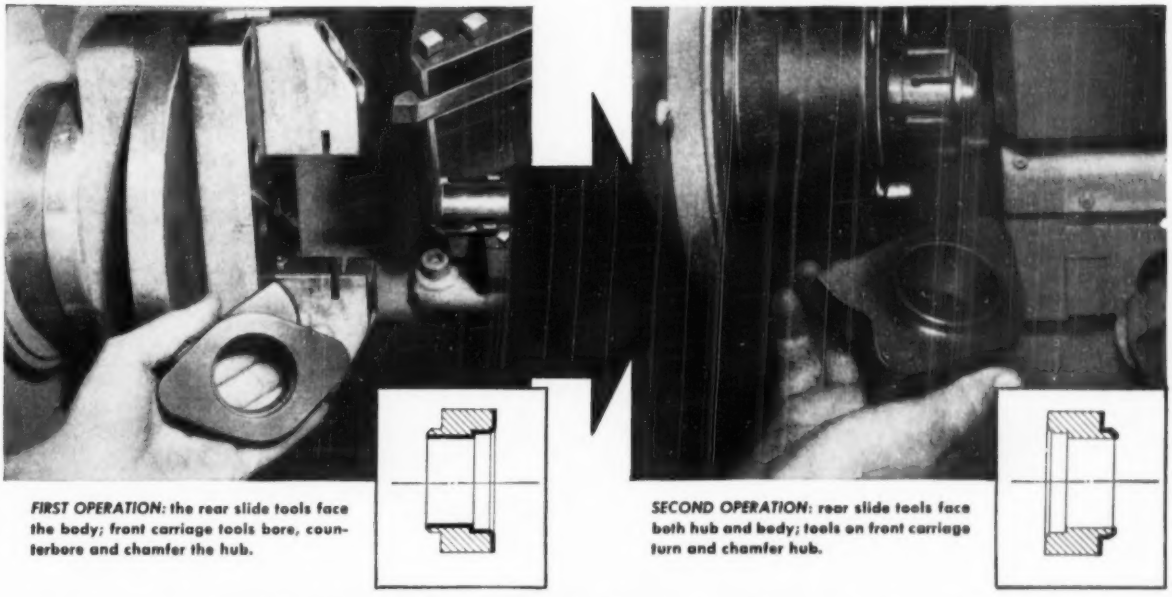
JOHN BATH CO. INC. · WORCESTER · MASS ·

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED
22 Grafton St., Worcester, Mass.

Quick "pass-along" idea

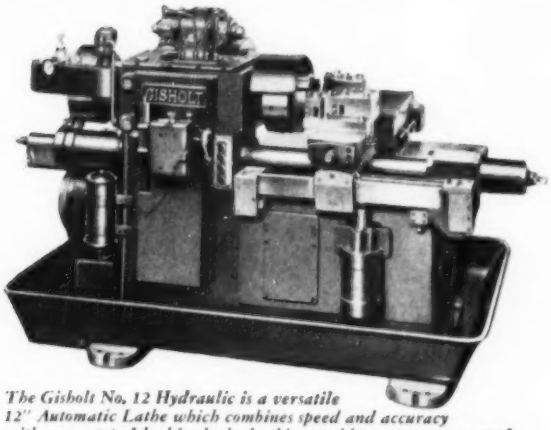
INCREASES PRODUCTION



FIRST OPERATION: the rear slide tools face the body; front carriage tools bore, counterbore and chamfer the hub.

SECOND OPERATION: rear slide tools face both hub and body; tools on front carriage turn and chamfer hub.

with pair of GISHOLT No. 12 Hydraulic Automatic Lathes



The Gisholt No. 12 Hydraulic is a versatile 12" Automatic Lathe which combines speed and accuracy with easy setup. Ideal for both chucking and between-centers work.

One operator with two standard machines now handles these cast iron manifold bodies in rapid succession—at a pace of 80-per-hour, at 80% efficiency.

This two-machine team pays off many ways: The operator loads and unloads one machine while the other is working—*automatically.* Investment is at a minimum because both machines *and* tooling are standard. Tool setups and replacements are simple.

Whether you have continuous runs like this or even smaller job lot work—the speed and automatic operation of the Gisholt No. 12 Hydraulic may be your answer to lower costs. It's worth investigating.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

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full course or short orders

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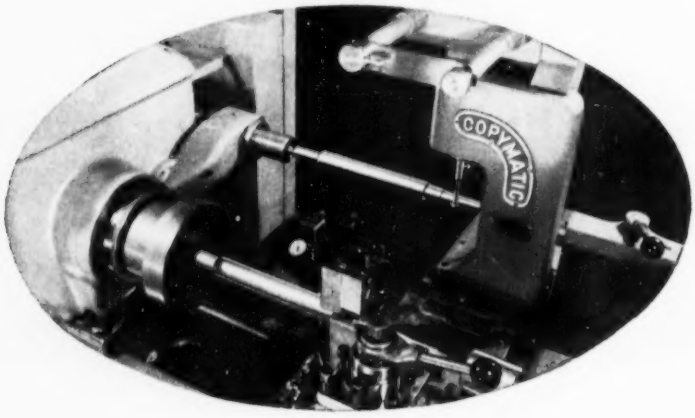

What's on your lathe work "menu"?

"Short order" limited runs, 5 or 25 pieces?

"Full course" turning production, 500 or more pieces?

Or both? Here's the lathe that satisfies any production "appetite."

For example, Leland Electric Co., Division of American Machine & Foundry Co., finds the COPYMATIC "the answer to short order lathe turning . . . saves 8 hours per day . . . 1 man's salary per year!" On large runs, users report production increases up to 536%.

Reports on jobs comparable to yours are available in case histories together with NEW descriptive Bulletin No. 675. Write for your copies.

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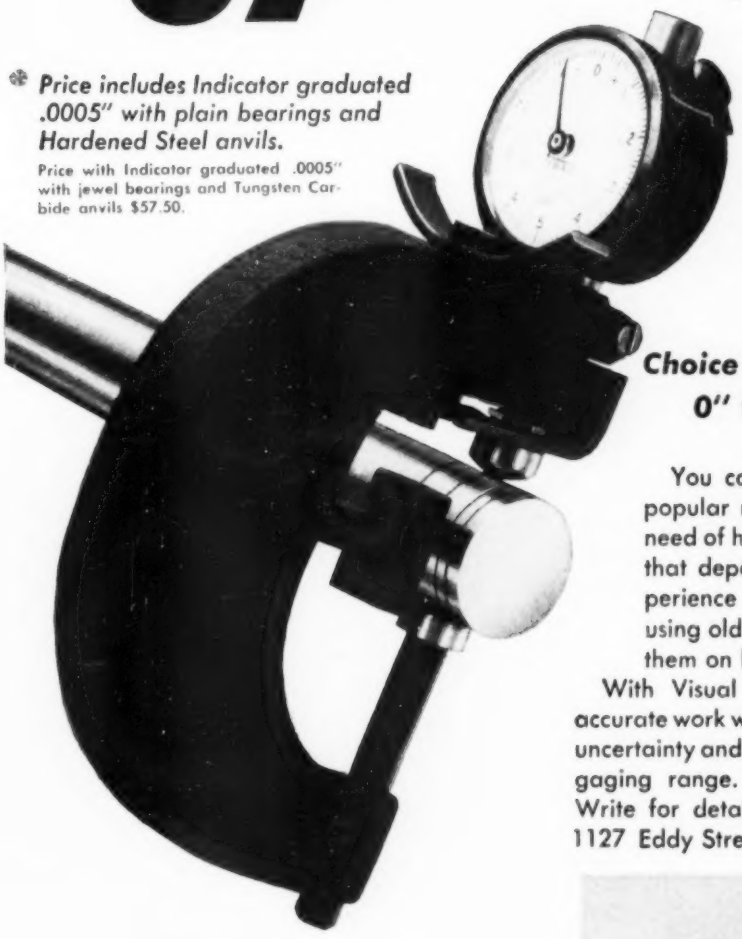
$37.50* buys this Indicating SNAP GAGE

* *Price includes Indicator graduated .0005" with plain bearings and Hardened Steel anvils.*

Price with Indicator graduated .0005" with jewel bearings and Tungsten Carbide anvils $57.50.



Choice of 3 capacities:
0" to 1", ¾"to 2", 1¾"to 3¼"

You can't afford to be without the most popular modern Indicating Snap Gage. No need of hanging onto antiquated snap gages that depend on blind, uncertain "feel". Experience proves you aren't saving money using old style gages just because you've got them on hand.

With Visual Indicating Gages you get more accurate work with less scrap. They relieve operator uncertainty and frustration. And, they cover a wider gaging range. Larger sizes are available, too. Write for details. Federal Products Corporation, 1127 Eddy Street, Providence 1, R. I.

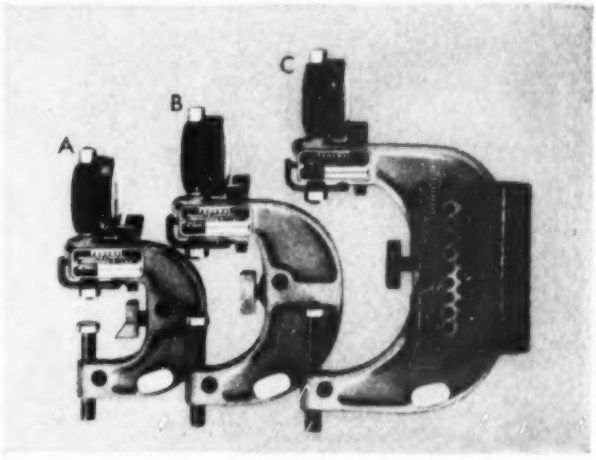
Set of 3 Gages covers all sizes from 0" to 3¼"—replaces rackfuls of old style gages.

A Model 1000P-1 —A
Capacity 0" to 1"

B Model 1000P-2 —A
Capacity ¾" to 2"

C Model 1000P-3 —A
Capacity 1¾" to 3¼"

Larger sizes available.



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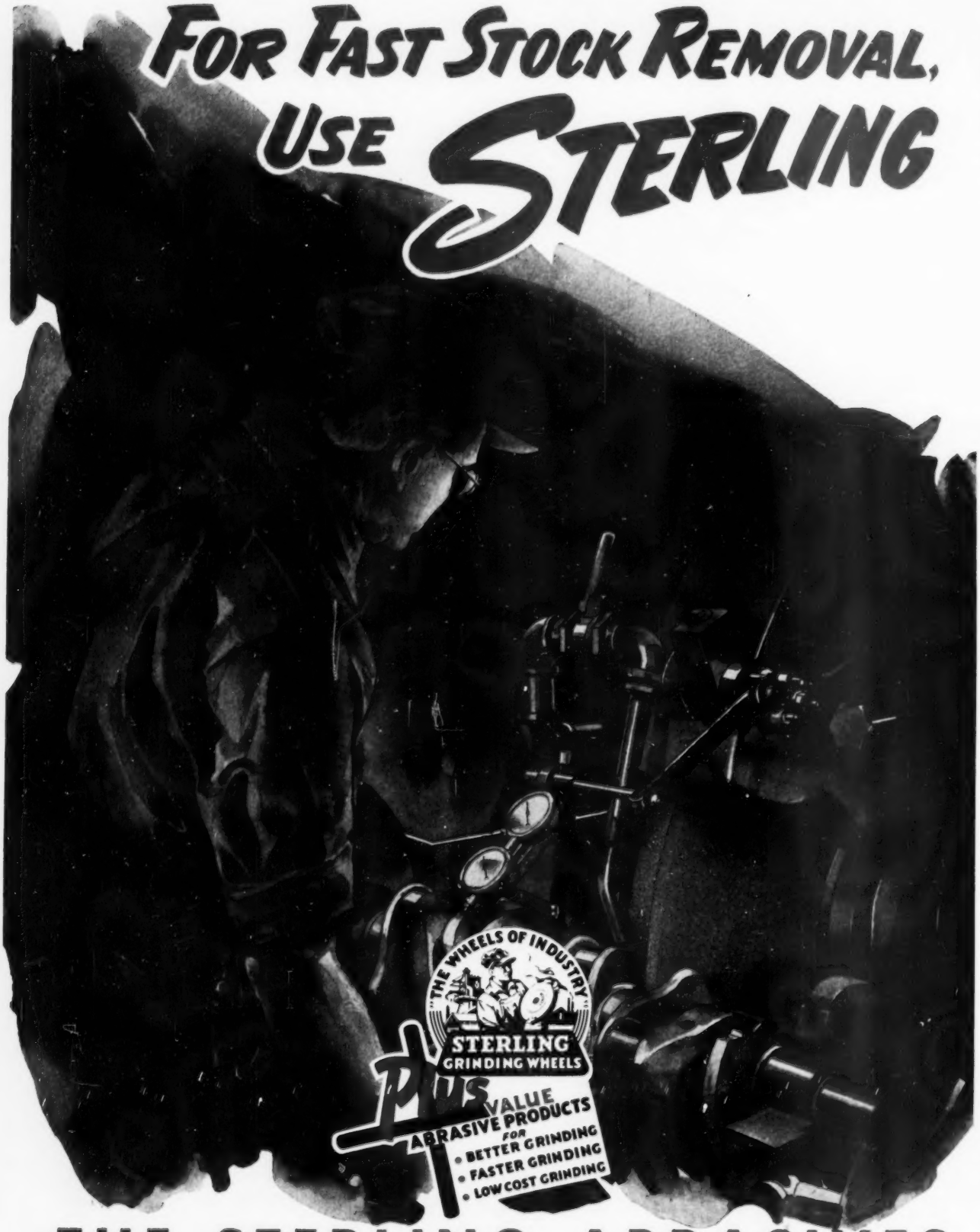

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Crankshaft grinding is a very exacting operation. No other type of grinding imposes such harsh demands on grinding wheels. In the roughing operation, great amounts of stock have to be removed. Yet, in the finishing, very close limits are the rule. The crankshaft grinding wheel must stand up under these punishing operations, hold its corners and give long, money-making service.

Sterling Crankshaft Grinding Wheels, built to the special demands of your particular jobs, have a tailor-made, specification-spread that makes them applicable for the solution of any of your crankshaft grinding problems. Backed by the most intensive research and development program, Sterling's "Wheels of Industry" are offering extra value that is worthy of the investigation of those interested in obtaining the best.

Because of the intense study behind these superior wheels by our technicians and engineers, you can demand unusually fine finishes, far beyond what is ordinarily obtainable from crankshaft grinding wheels. To obtain the finest grinding results is a simple matter---write us today and our engineers will gladly arrange a wheel test on your machines to prove the high quality of the wheels that are best---Sterling's!

Best in the Test--That's STERLING!

In a recent test of a 42 x 1.465 x 12 Sterling "Wheel of Industry," this abrasive unit was very satisfactory on 80 lb. crankshafts, stock removal being .055 on O. D. and .070 on the sidewall. This wheel cut freely and held corners exceptionally well.

It was much better than the competing wheel and was designated by the customer as being the best wheel ever tested in this well known plant. Similar results may be obtained on your crankshaft grinding jobs with Sterling Grinding Wheels. Ask for a test today!

Write for These STERLING Research and Development Folders . . .

Anyone interested in better grinding will appreciate the important data to be found in this literature. The popular "Art and Science of Grinding," just off the press, is included in this group of books and folders. Together, they form a most complete series to keep in a handy file for ready reference. When quick decisions are necessary on various types of grinding jobs, you will welcome the information included in these folders. Ask for your copies today—no obligations!

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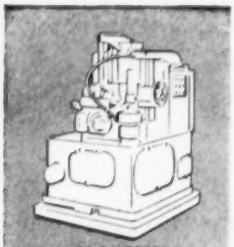
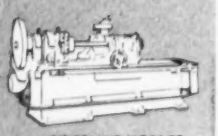


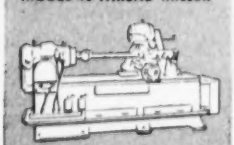
12-S HOBBER

7-A ROTARY HOBBERS

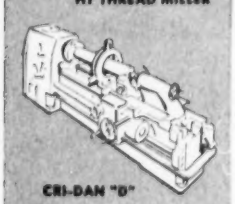


5H SPLINE HOBBER

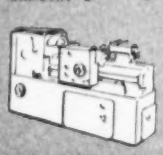
MODEL 40 THREAD MILLER



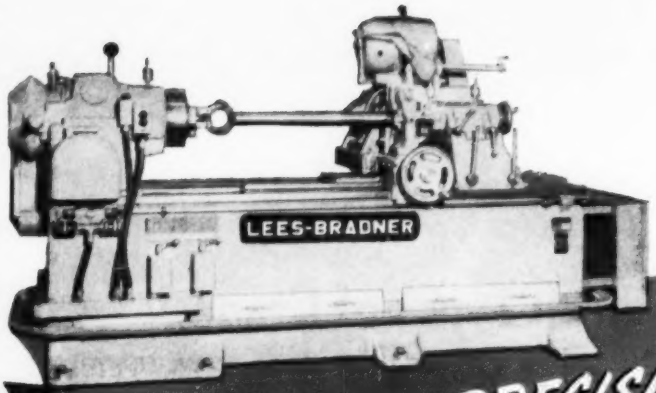
HT THREAD MILLER



CRI-DAN "D"



CRI-DAN "B"



RUGGED PRECISION

of the Lees-Bradner Model HT Thread Miller

HELPS PRODUCE

RUGGED POWER

for Caterpillar

It's not surprising that Caterpillar should select the Lees-Bradner HT Thread Miller to help produce the famous line of Caterpillar earthmoving equipment. They have a lot in common.

Both are extra rugged and unusually versatile. Both are built for long, efficient service and both are leaders in their respective fields.

No matter what the threading job, chances are the Lees-Bradner HT Thread Miller can meet your requirements—for accuracy, speed and the wide range of work it can accommodate.

Call your Lees-Bradner representative for the whole story on the HT Thread Miller—or write us direct.

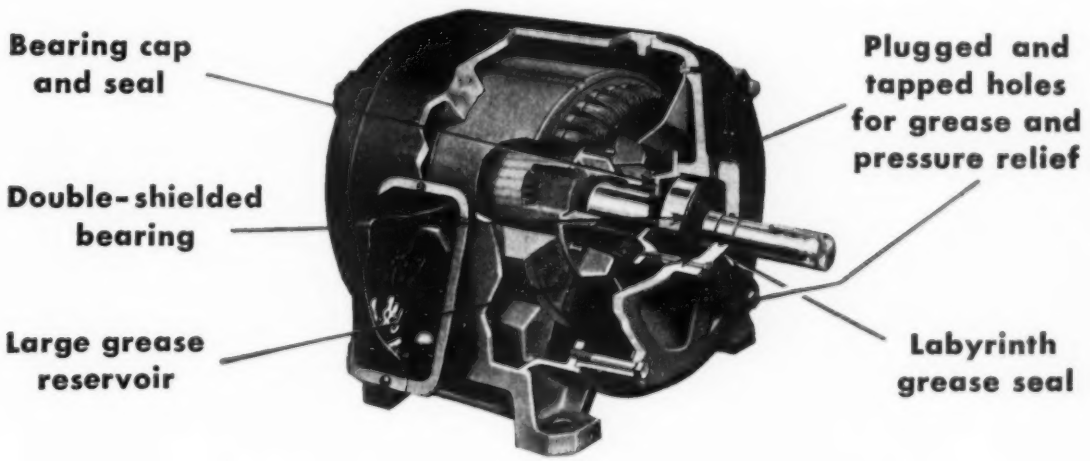
the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

Here Are Facts You Should Know About Electric Motor Bearings

An ideal motor bearing would operate for indefinitely long periods under all types of conditions without requiring any attention whatever. However, in the opinion of our engineers, such a bearing and its attendant lubricant are not yet available on the commercial market. Consequently, bearings for many types of operations, particularly where overloading, extreme temperature ranges and chemical and dirt laden atmospheres are involved, require special lubricants or regular lubrication schedules.

Of course, bearings suitable for many kinds of operation under normal conditions can be built to require no attention for very long periods — usually several years. Allis-Chalmers can supply sealed bearings in all frame sizes through 505 on short delivery and without extra cost for applications of this type.


Bearing cap and seal
Double-shielded bearing
Large grease reservoir
Plugged and tapped holes for grease and pressure relief
Labyrinth grease seal

Which is the Best Design for *Your* Application?

But, we believe that the design used in standard Allis-Chalmers drip-proof, tefc and explosion-proof motors represents the best design for most industrial users.

The Allis-Chalmers standard design consists of a prelubricated, double-shielded bearing mounted in the end housing with a generous grease reservoir. Plugged and tapped holes are provided for grease and for pressure relief. Under normal operating conditions, this design will operate as long without attention as any other type of bearing in use today. But where difficult operating conditions make relubrication desirable, it can be done as part of the normal lubricating-routine without dismantling the motor.

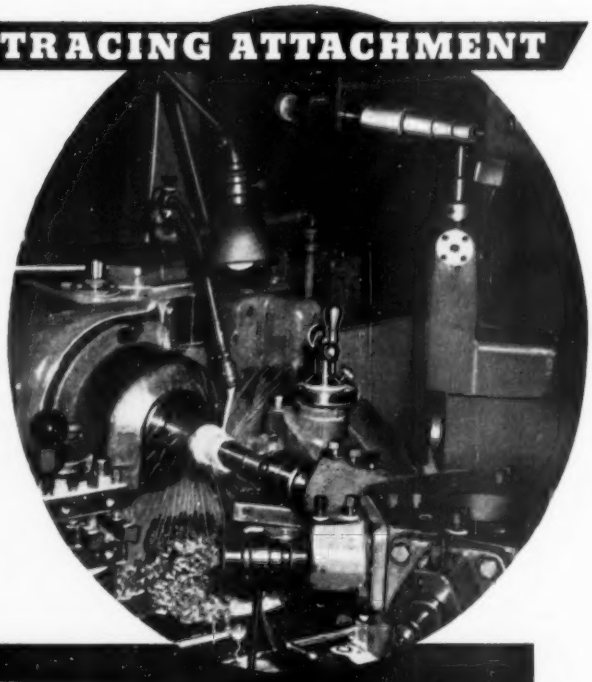
The large grease reservoir and shielded bearing design assure that grease lost from the bearing due to high operating temperatures or other causes will be replaced automatically.

For further information on bearing design and other features of Allis-Chalmers motors, call your nearby Allis-Chalmers District Office or Authorized Distributor. A-4130

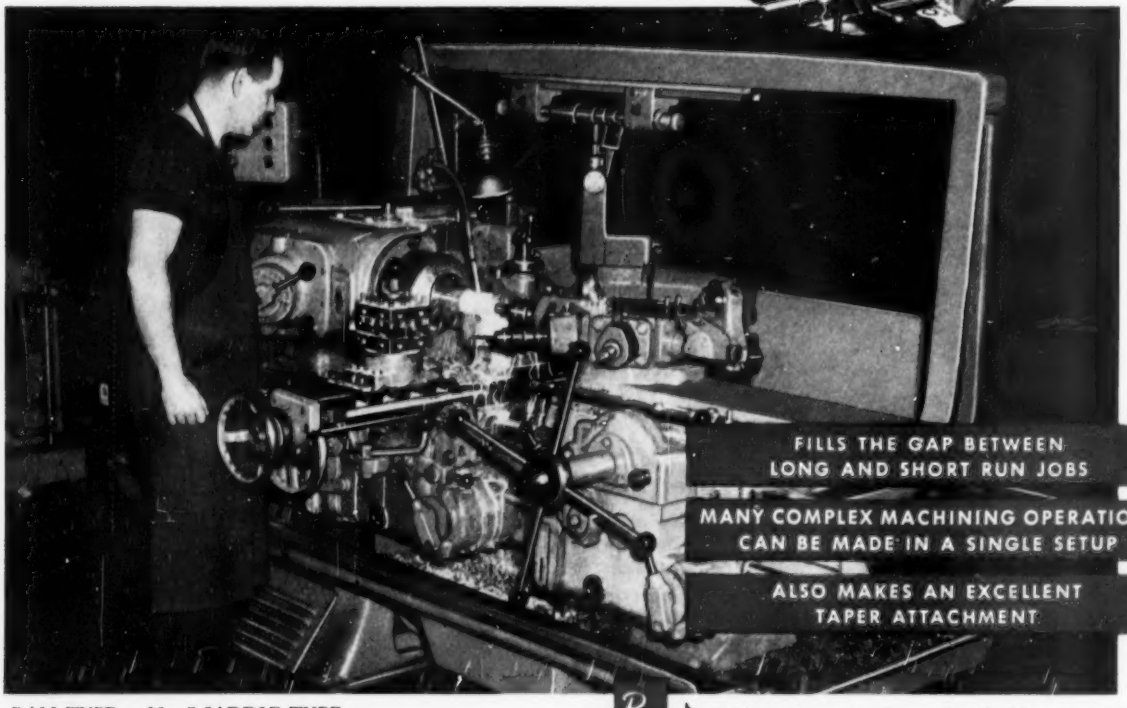
ALLIS-CHALMERS

NEW HYDRAULIC TRACING ATTACHMENT

for J&L turret lathes*



Will reduce your costs — direct and indirect — by combining in a single machine all the advantages of TRACING for contour turning, boring or facing operations, with the advantages of multiple tooling and the many other time saving, cost saving features of J & L Universal Turret Lathes.



FILLS THE GAP BETWEEN LONG AND SHORT RUN JOBS

MANY COMPLEX MACHINING OPERATIONS CAN BE MADE IN A SINGLE SETUP

ALSO MAKES AN EXCELLENT TAPER ATTACHMENT

RAM TYPE or No. 7 SADDLE TYPE

P.S. This attachment can be purchased with new machines or installed in the field on machines now in service. Write for descriptive leaflet giving complete specifications.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L TURRET LATHE DIV.

HERE'S WHY and WHEN

Four of the complete line of Hannifin lever-type Air-Operated Presses that include over 30 basic models in capacities up to 18 tons.

WE RECOMMEND

HANNIFIN AIR PRESSES

. . . ***for Production Operations*** involving assembly, marking, staking, riveting or punching of small parts. Hannifin ½ and 1-ton air presses are fast, safe and economical . . . in both initial cost and operating cost.

. . . ***for Bigger Pressing Operations*** where infrequent use would not warrant the purchase of a hydraulic press. Hannifin lever type air presses are low in first cost . . . assure efficient, uniform work . . . are far more economical to operate than out-moded manual presses.

Select the press you need from the complete Hannifin line of air presses. All operate off ordinary shop air supply. There are over 30 basic models from which to choose, many for either bench or floor mounting. Capacities range from ½-ton to 18 tons . . . ram strokes up to 15 inches . . . daylight to 46 inches . . . reach to 12 inches.

Hannifin Series M ½ and 1-ton Air Presses. Supplied with or without electric valves for push button operation.

Hannifin Series A ½ and 1-ton Air Presses. Notice these have adjustable gap.

WRITE FOR BULLETINS 250, 251 and 252

Hannifin Representatives Are at Your Service in These Leading Industrial Centers

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Please send me Bulletins 250, 251 and 252 on Hannifin Air Presses.

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Henry P. Cowen, President of MacGregor Golf Co., Cincinnati, Ohio, asks an unusual question:

"Which club is worth $8,000?"

"Jack Burke was teed off!

"He was leading the Texas Open after two red-hot rounds. Then a souvenir-hound stole a custom-made 11-iron from his bag. Without that MacGregor 'Double Duty' iron, he was in trouble!

"He sent us a desperate telegram at Cincinnati. We called Air Express — and a duplicate club was in his hands the next morning!

"He went on to win the Texas Open and three more tournaments in quick succession. His new MacGregor 11-iron (6th from the right) was worth $8,000 in prize money — thanks to Air Express!

"Jack and our other staff professionals are the 'proving ground' for MacGregor golf equipment. Keeping these famous players supplied as they move from tournament to tournament could be a tough job. But Air Express reaches them quickly—wherever they are.

"Demands of tournament committees, pro shops and retailers keep us calling on Air Express day in and day out. Air Express has never failed us. Yet costs on most of our shipments are actually *lower* than other air services.

"We save money by specifying the fastest service — Air Express!"

It pays to express yourself clearly. Say Air Express! Division of Railway Express Agency.

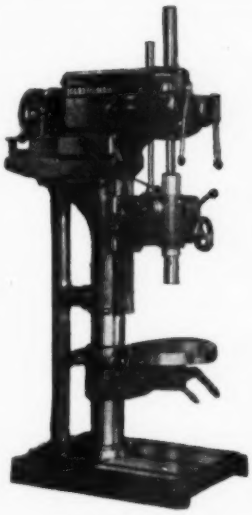
AIR EXPRESS

GETS THERE FIRST

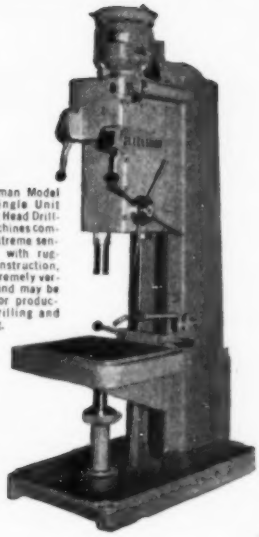
via U. S. Scheduled Airlines

THE CLEEREMAN LINE

OF PRECISION JIG BORERS AND DRILLING MACHINES

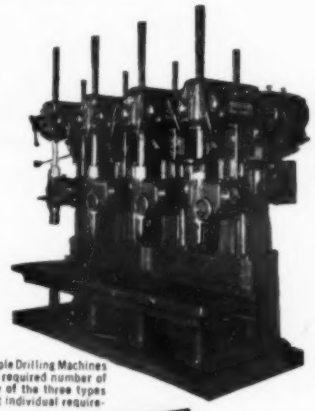


Cleereman Round Column Drilling Machines produce accurate holes at high speed and at low cost and are general purpose machines with high production.

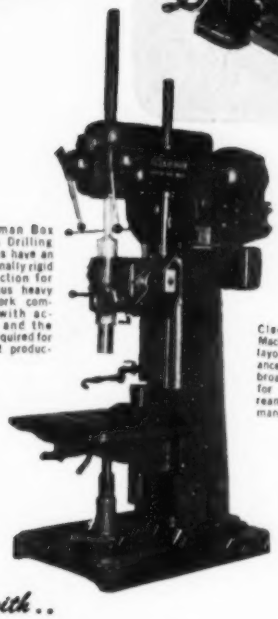


Cleereman Model 325 Single Unit Sliding Head Drilling Machines combine extreme sensitivity with rugged construction, are extremely versatile and may be used for production drilling and tapping.

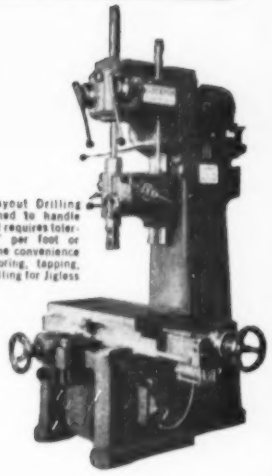
Cleereman Jig Borers noted for unexcelled precision, extreme accuracy, ease of operation in small lot production and in producing tools, dies, jigs or fixtures. Models available with electrically controlled prepositioning.



Cleereman Multiple Drilling Machines consisting of the required number of machines of any of the three types supplied to meet individual requirements.



Cleereman Box Column Drilling Machines have an exceptionally rigid construction for continuous heavy duty work combined with accuracy and the speed required for low cost production.



Cleereman Layout Drilling Machine designed to handle layout work that requires tolerances of .001" per foot or broader. Extreme convenience for drilling, boring, tapping, reaming and milling for Jigless manufacturing.

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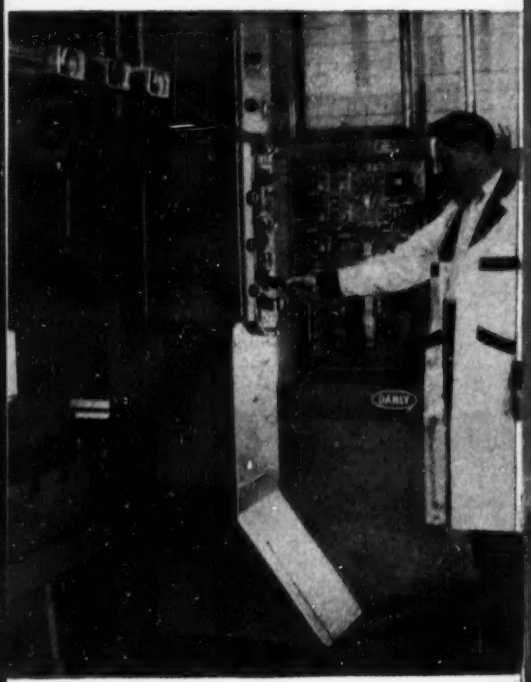
CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

stamping capacity - for the TOUGH jobs



CUSTOM-DESIGNED CONTROLS

Danly Controls are engineered to the individual press in accordance with the specific operating requirements . . . providing simplified installation, greater safety and ease of operation. Note the Danly Master Control Cabinet in the background, "packaged" for efficient installation and maintenance.

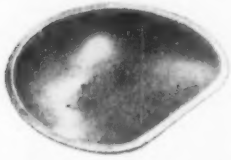
GREATER PRESS ROOM FLEXIBILITY

View of Danly 600-ton Single Action Straight Side Press in operation. Danly's extra-rigid construction assures full rated capacity . . . for bigger work, heavier work, more kinds of work. It's built to stand up under around-the-clock operation, too, to meet emergency production demands.

PRODUCTION TIME CUT IN HALF

4 single stage dies are involved in stamping the farm tractor seat pan shown . . . but only 2 stamping operations are necessary instead of 4. 2 operations are performed at one stroke. Dies are mounted two at a time to produce 300 pieces per hour—cutting production time in half!

a DANLY PRESS *does it!*



FOR WISCONSIN METAL PRODUCTS CO.

The addition of this 600-ton Danly Straight Side Press represents an important expansion of shop capacity for the Wisconsin Metal Products Co., of Racine, Wisconsin. It means far more than just another press because its 96 by 42 inch bed opens up a whole new field of operation in large stampings . . . and provides important "capacity insurance" for a wider variety of jobs.

Exclusive Danly Press features mean lower stamping costs too. Automatic *oil* lubrication decreases maintenance requirements . . . the Cool-Running Clutch wears longer, reduces down-time . . . greater structural rigidity assures less vibration and bed deflection, increases die life. Whatever your requirements, there's a Danly Press designed to increase *your* stamping capacity—for the TOUGH jobs.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

DANLY

MECHANICAL PRESSES . . . 50 TO 3000 TONS

HYDRAULIC METALWORKING EQUIPMENT

Send for this free Booklet today

. . . see how you can put Danly Presses to work in your plant for increased capacity at lower cost!

It costs less to run a DANLY PRESS

Single Action Straight Side | Autofeed | Underdrive Single, Double, Triple Action | Gap Frame | Double Action Straight Side

LONG-LENGTH BUSHINGS ARE STANDARD AT UNIVERSAL—

No waiting for production

All long-length bushings listed as standard in the Universal Catalog are regular stock items which means speedier delivery to you. If you have been experiencing difficulty in securing long-length bushings, it will pay you to investigate Universal's service. The *super finish I.D.* of Universal Standard Drill Bushings lengthens bushing life . . . reduces tool breakage . . . slashes drill wear.

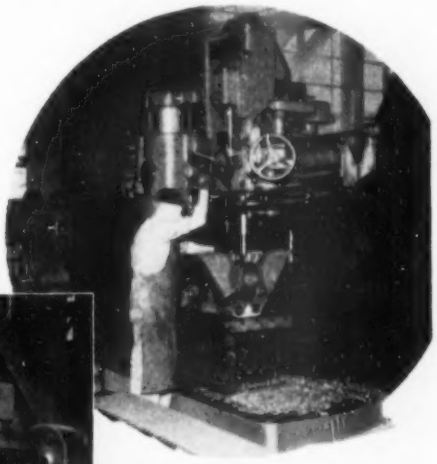
With the added features of blended radius, knurled head, I.D. break and chamfered O.D., you'll get better bushing service and need less replacements. To further speed delivery order from the warehouse nearest you—1060 Broad St., Newark, N. J., 5035 Sixth Ave., Kenosha, Wisc., or the home office.

UNIVERSAL ENGINEERING COMPANY

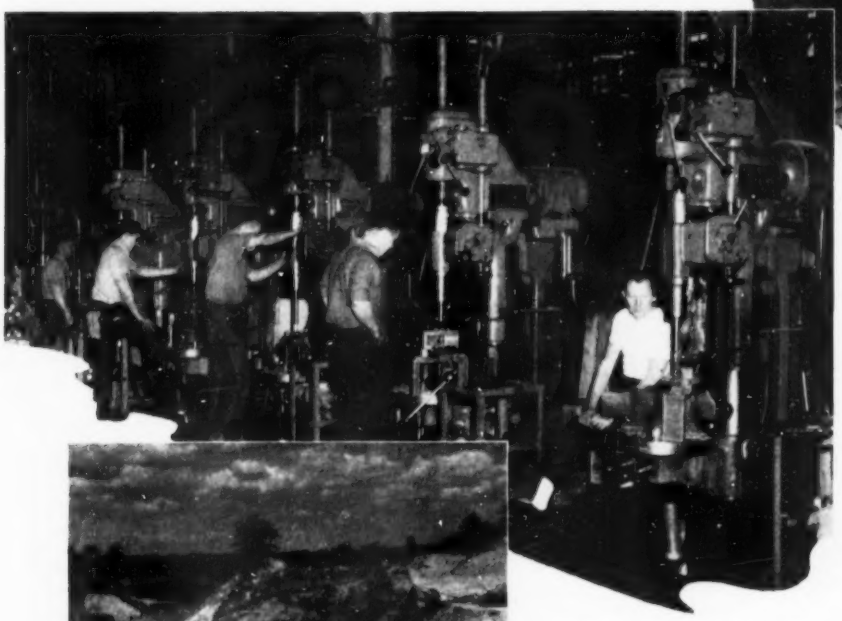
FRANKENMUTH 2, MICHIGAN

OTHER UNIVERSAL PRODUCTION TOOLS

It's CINCINNATI BICKFORD at Bay City Shovels, Inc.



Cincinnati Bickford Super Service Radial drilling equalizer support for torque rods and rocker arms.



Photos courtesy
Bay City Shovels, Inc., Bay City, Michigan

25 years ago Bay City Shovels, Inc., bought its first Cincinnati Bickford Drill. Today high speed drilling in tough alloy steels—(in the manufacture of sturdy Bay City Shovels) is being done by a battery of eleven Cincinnati Bickford Radials and upright Drills. For example, one of these Super Service Radial Drills has increased production on power crane and shovel revolving bases by cutting floor to floor time from 6½ hours to 4¼ hours. Production of the smaller parts is being speeded by the all-geared upright drills.

Write for Bulletins covering Radial and Upright Drills.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.
Cincinnati 9, Ohio, U.S.A.

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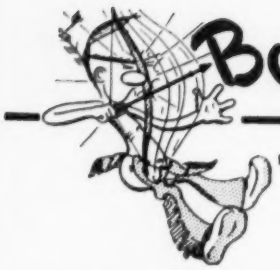


Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Going-Going-Gone

Referring to my earlier letter (*AM*—June 8 '53, p114) concerning old bound volumes of *AM*, I wish to advise you that these have been sent to the Mechanical Engineering Dep't, Queen's University, Kingston, Ont, and are, therefore, no longer available to your readers.

H G Bertram
Dundas, Ont

Private Time

Your comment regarding the prohibition of Daylight Saving Time in the State of Washington (*AM*—June 8 '53, p193) brings up some interesting points. The first concerns the question of how far a single State should be permitted to act contrary to generally accepted usage or custom. During World War I it was illegal to display Daylight Time publicly in the State of Connecticut.

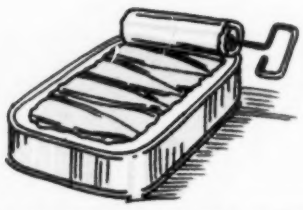
Many, in Connecticut and elsewhere, displayed their ignorance by using the terms God's Time and Wilson's Time. They did not seem to know that we had not used God's Time since the 1880's and that, before we adopted Standard Time, Boston, New York and Philadelphia all had different times. For God's time was sun time, which was abandoned because of its confusion in railroading. The Navy also had a hand in making the change.

On the other hand, the Boeing method of simply changing the work starting and quitting time is suggestive of what could be done to advantage elsewhere. Instead of setting clocks ahead or back, how much more simple it would be to move the starting and stopping hours for work ahead one hour on a given date, and move them back again in the fall.

When I have proposed this in years past, there has been an outcry against going to work or getting up an hour earlier. People seem to like to be kidded. So they turn the clock ahead and think they are getting up at the same time as before. Of course, it does give them a chance to grouse about losing an hour's sleep in the spring and to think they are putting one over on somebody by getting it back in the fall. But how much less trouble to say that on a certain Monday the shop starts work at 6:30 instead of 7:30 so the 8-hr shift gets through an hour earlier. The railroads spend a lot of money in getting out new timetables and there is the confusion that too frequently comes by missing trains or

GRINETICS

By D G SMITH



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rohoning

DUCES COST

IMPLIFIES PROCESSING

PROVES ACCURACY...

Chosen over other methods, the Microhoning process is being used to generate the inside surface of the new 280 mm atomic gun barrel!

Microhoning . . . corrects all inaccuracies left by previous operations and generates a round, straight bore . . . eliminates several processing operations formerly required to obtain the necessary accuracy . . . facilitates broaching of the rifling by providing a true piloting diameter . . . assures a superior seal between the barrel and the projectile.

Constant improvement in this application has pr

a Microhoning tool with a gage built into its nose, simplifying diameter checking and cutting 4/5 off the former Microhoning time!

This is another example of how Micromatic is continually developing new and better equipment for Microhoning all types of surfaces regardless of length, diameter, or material.

NEW MICROMATIC TOOL CUTS MICROHONING TIME BY 80%

MICROHONING = STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH

MICROMATIC HONE CORPORATION

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Los Angeles 23, California

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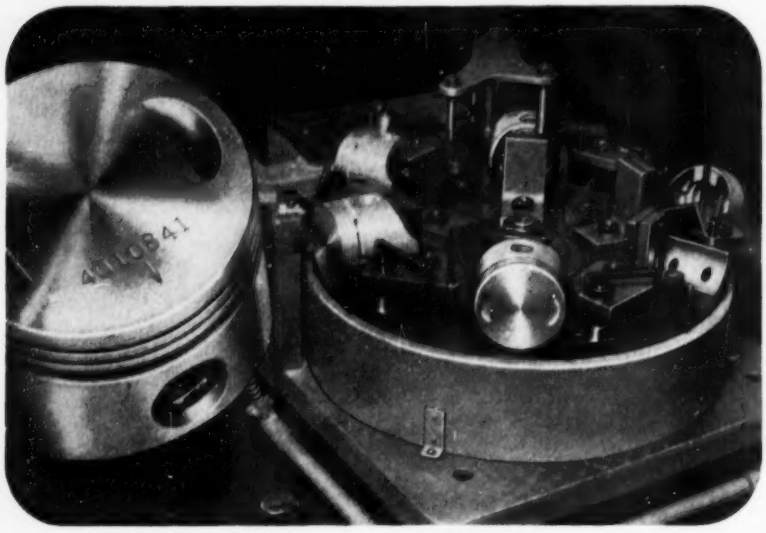
LEADERS IN INDUSTRY MARK WITH NOBLEWEST



LEADING *AUTOMOTIVE* MANUFACTURERS

Save Time and Money with Noblewest

HIGH SPEED PRODUCTION MARKING MACHINES

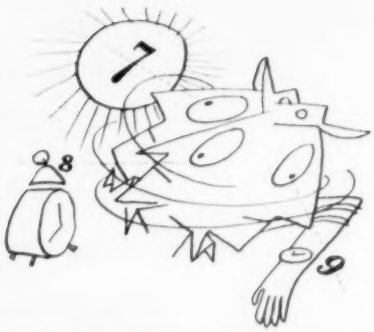
The new Model 342 (illustrated above) is another fine example of Noblewest's unique ability to provide industry with high speed marking equipment for part numbering, trade marking, or date coding. This model was especially designed for permanently marking and ejecting approximately 2500 pistons per hour with absolute uniformity of impression. Basic model (right) can be tooled for marking many sizes and shapes of component parts in metal, plastic, hard rubber and wood. Whatever your needs for marking, Noblewest makes the machines, tools and dies to do the job *faster, better at lower cost.* For complete details, write Noble & Westbrook Mfg. Co., 17 Westbrook Street, East Hartford 8, Conn.

Noblewest is equally famed for fine marking dies . . . made to the most exacting standards of quality . . . yet, they are competitively priced.

MARK IT BEST WITH NOBLEWEST Roll-O-Matic MARKING

NOBLEWEST IMPROVED MARKING DEVICES

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING



waiting an hour for one, because of the change in time.

If the action of the State of Washington could lead industry to similar action, as with Boeing, it would be a highly desirable result from a dubious cause. Do we have to keep on kidding ourselves that we are going to work at the same time as before? Why not grow up and simply shift working hours and let the clocks alone?

Fred H Colvin
Point Pleasant, N J

Wet or Dry

A couple of comments might be helpful in connection with the practical idea "Auto Fuel Pump Works for Coolant" (AM—May 25 '53, p 149). We recognize the machine in the picture as one of our early bench models.

Wet honing has many advantages over dry honing. In addition to keeping the work cool, wet honing washes out metal particles and abrasives to the work is ready to gage at any time. It also speeds honing action, and helps produce better finish. Honing stones and mandrels last long when used for wet honing.

However, there's more to wet honing than just directing a stream of coolant onto the work. For example: Wet honing usually requires a finer abrasive for a specified surface finish. This is one result of the faster cutting action. Thin oil or kerosene may hinder rather than help the honing action. Certain additives to the honing oil have been found necessary for best results. If improper coolant is used, the honing stone frequently loads, and ceases to cut. Proper honing oil keeps it clean and free cutting. Specially blended honing oils are needed for metals like stainless steel and certain aluminums, with hard or stringy characteristics.

We have furnished wet honing machines to the industrial field for many years, and have made wet honing conversion units available for customers who had earlier model, bench-type dry honing machines.

Correct application of the ma-

chines requires some knowledge of metals, abrasives, and coolants. We have a rather large staff of field representatives who are factory trained in the use of our equipment. They are on call at all times without obligation, for analyzing job requirements and recommending proper honing methods.

N H Hale
Sunnen Products Co
St Louis, Mo

Museum Piece

On many occasions, *AM* has stressed the to-be-lamented fact that many large corporations continue to have antiquated machines in their shops.

With few exceptions, one cannot say that the average railroad shop or shipyard has uptodate equipment. This is understandable if one considers the usual oversize specifications which they, and a few others, insist upon for their machines. However, no matter how heavy and good these machines were at the time of purchase, they are woefully out of date by today's standards.

Some of these companies, when finally installing new equipment, want to sell their old machines and send a list to their suppliers, giving age and other particulars.

One such list itemizes 11 different machine tools whose average age, as of "when placed in service," is over 38 years and, believe it or not, an Acme bolt cutter is listed as having been installed in 1880.

To bring such old stuff back into the market should be discouraged, and I am strongly in favor of a rule that such equipment should not be resold. It is too old, too dangerous, too inefficient, and should be scrapped. Or, if interesting enough on account of the thoughts of three generations hovering over it, could be sent to the Smithsonian Institution. But it should not be put back on the market.

Henry A Nau
Triplex Machine Tool Corp
New York

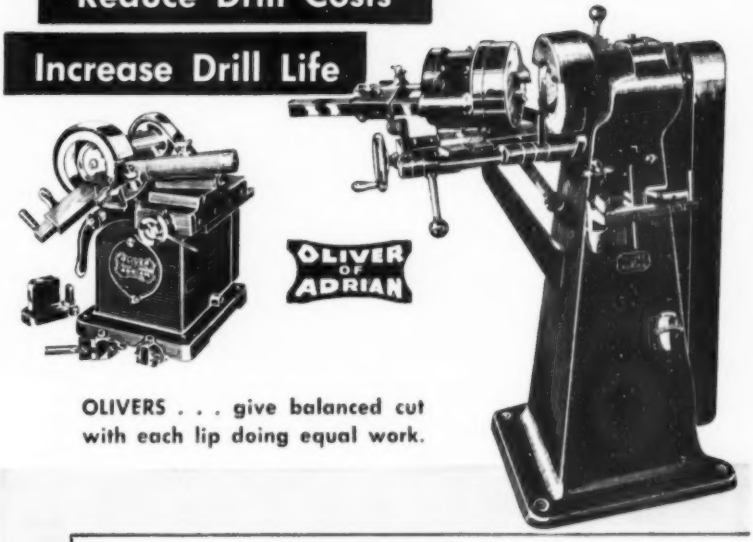
Dull Drills Are Costly!

Tests run recently to determine the cutting efficiency of drills at varying degrees of sharpness proved conclusively that, when properly machine-ground, twist drill life is increased about 300%.

OLIVER DRILL POINTERS

Reduce Drill Costs

Increase Drill Life



OLIVERS . . . give balanced cut with each lip doing equal work.

If you're wondering whether machine grinding drill points has an advantage over the old hand-grinding method, check the results of this test run recently to improve drill life: In operating hand-ground drills at a surface speed of 100 feet per minute in cast iron material, an average of only 99 cubic inches could be drilled effectively per tool. After drilling about 175 cubic inches of stock, hand-ground drills *completely broke down*. At the same speed, machine-ground drills removed an average of *450 cubic inches*—an increase in productivity of more than 4½ times over hand-grinding! To obtain *best* results with your drills, it is essential to use correctly sharpened drills. Avoid excessive drill costs and imperfect drill holes by machine-grinding on Oliver Drill Pointers—so your drills will cut faster, last longer and produce more accurate holes.

No. 510 for drills ¼" to 3"—2-3-4 flute. Variable clearances. Variable point angles. Automatic operation.
No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to ½". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

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"How To Produce More Holes With Your Drills!"
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AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
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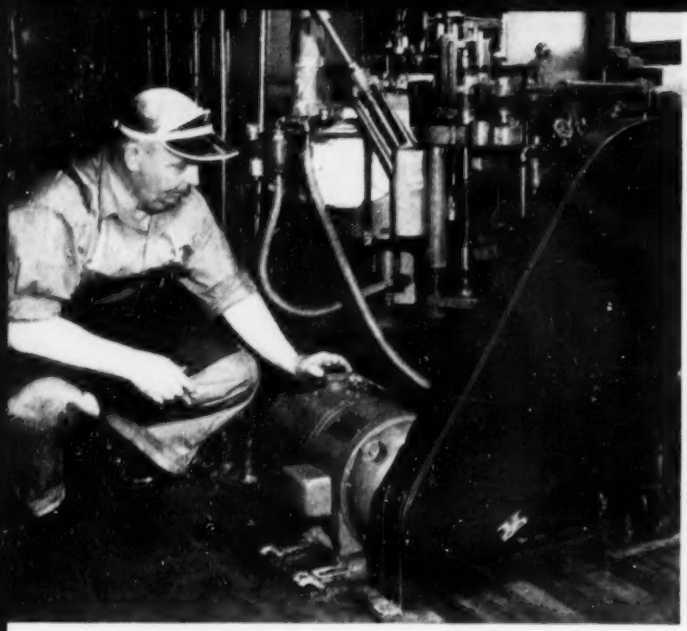
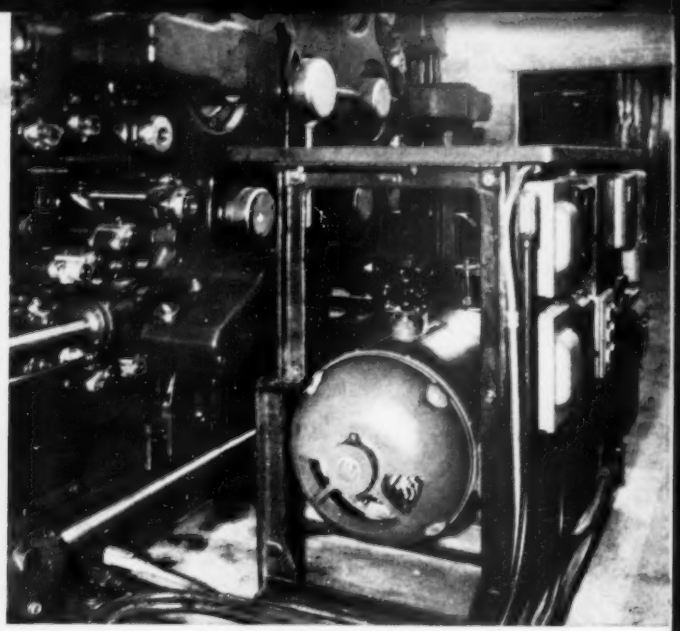
FACE MILL GRINDERS
DIE MAKING MACHINES

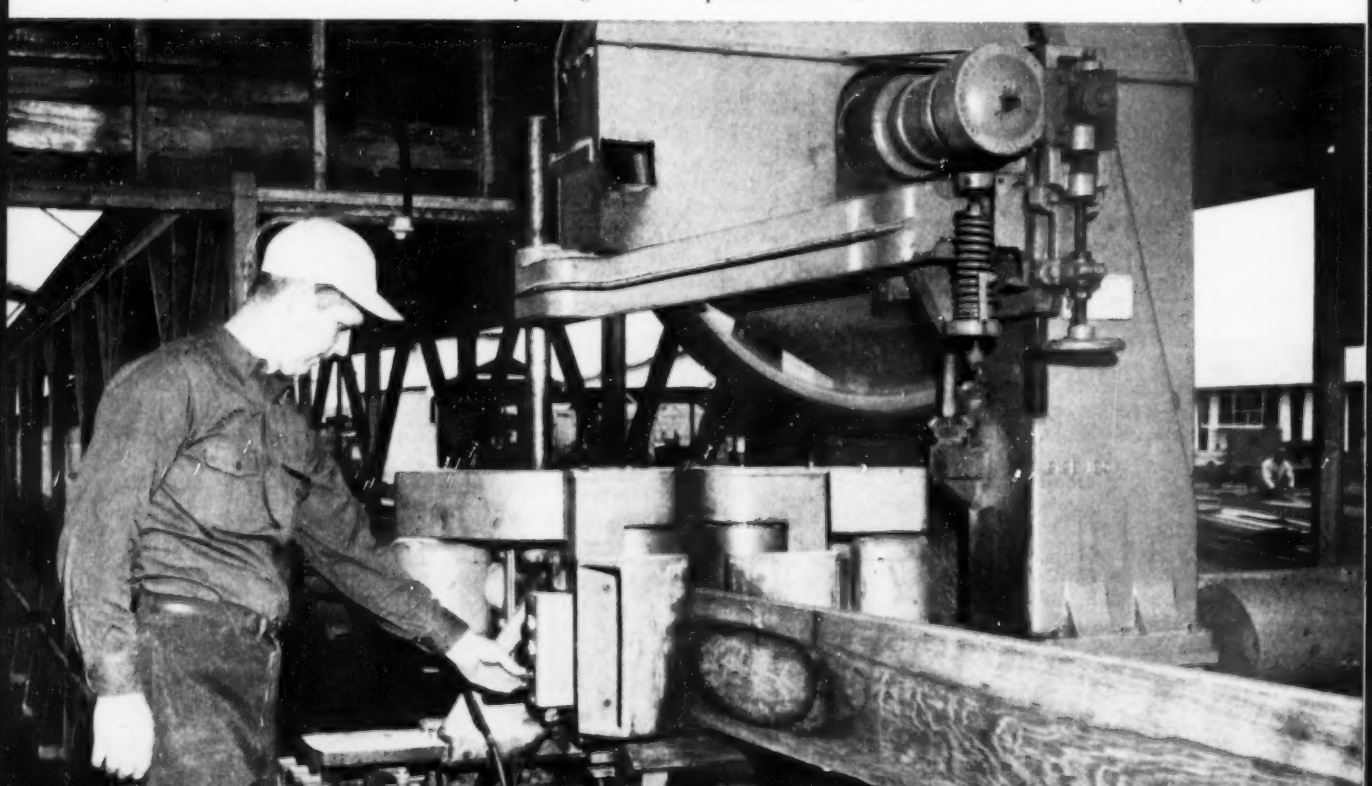


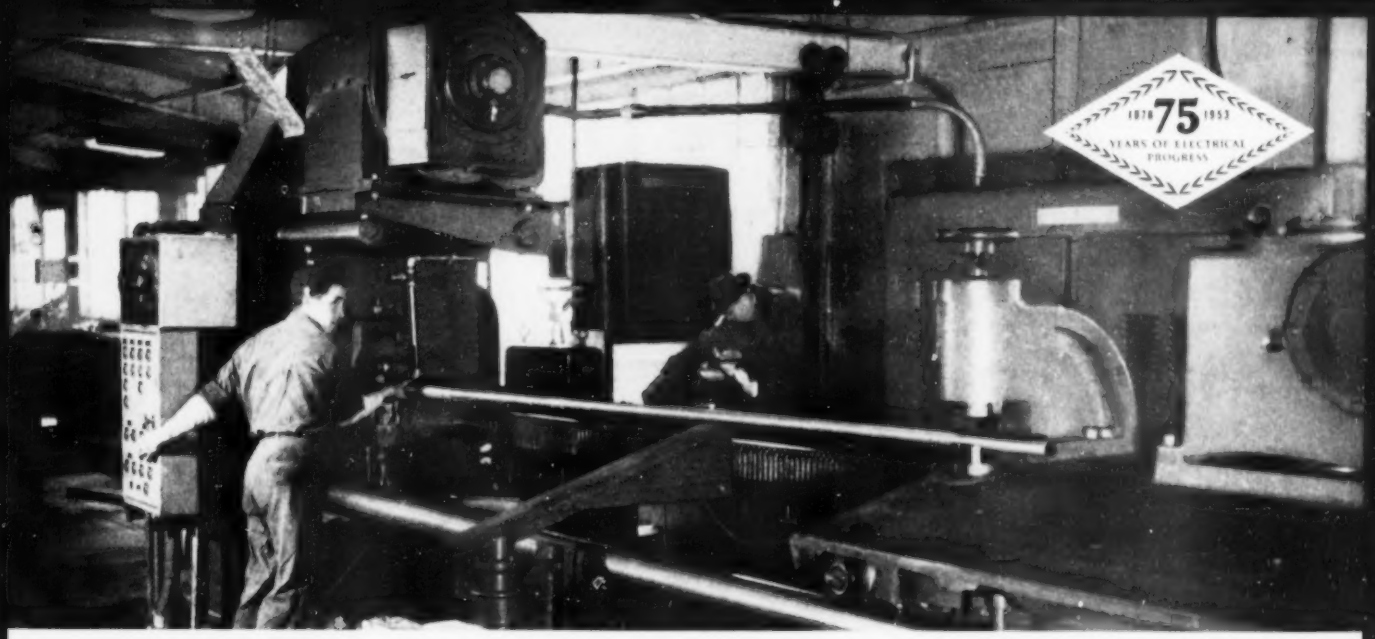


G-E ACA MOTOR as applied on a monotype casting machine in the plant of the Los Angeles Examiner (left) and as the main drive on a five color press in the plant of the Kansas Color Press, Lawrence, Kansas. The G-E ACA motor is your simplest and most economical electrical adjustable-speed drive. You get stepless speed adjustment directly from AC power over a 3 to 1, 6 to 1, and 20 to 1 range. No external conversion equipment is necessary. For additional information, check the coupon for Bulletin GEA-4883.

How a G-E Adjustable-speed Drive

G-E THY-MO-TROL* DRIVE at the San Jose Lumber Sales and Milling Company, San Jose, California, enables the operator to vary the speed of the resaw feed roll from 8 ft. to 250 ft. per minute. G-E Thy-mo-trol Drive can be made to hold speed regulation as close as ± ½%. It is available between 1/40 and 75 horsepower and offers smooth, stepless speed adjustment ranging up to 100 to 1. G-E Thy-mo-trol is easy to install, maintain, and operate. For complete information, check Bulletin GEA-5337 in the coupon at right.





TWO G-E SPEED VARIATORS, one of which drives the cutterhead and the other the bar-feed on this installation at the Allegheny-Ludlum Steel Co., Watervliet, N. Y. G-E Speed Variators are available in ratings from 1 to 200 hp, with excellent speed regulation and in speed ranges up to 40 to 1. With the addition of an amplidyne or electronic regulator, the Speed Variator will give you even closer speed regulation. The packaged power unit is easy to maintain, easy to move to new locations. Ask for Bul. GEA-5335 and 36.

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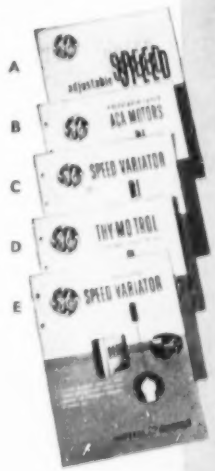

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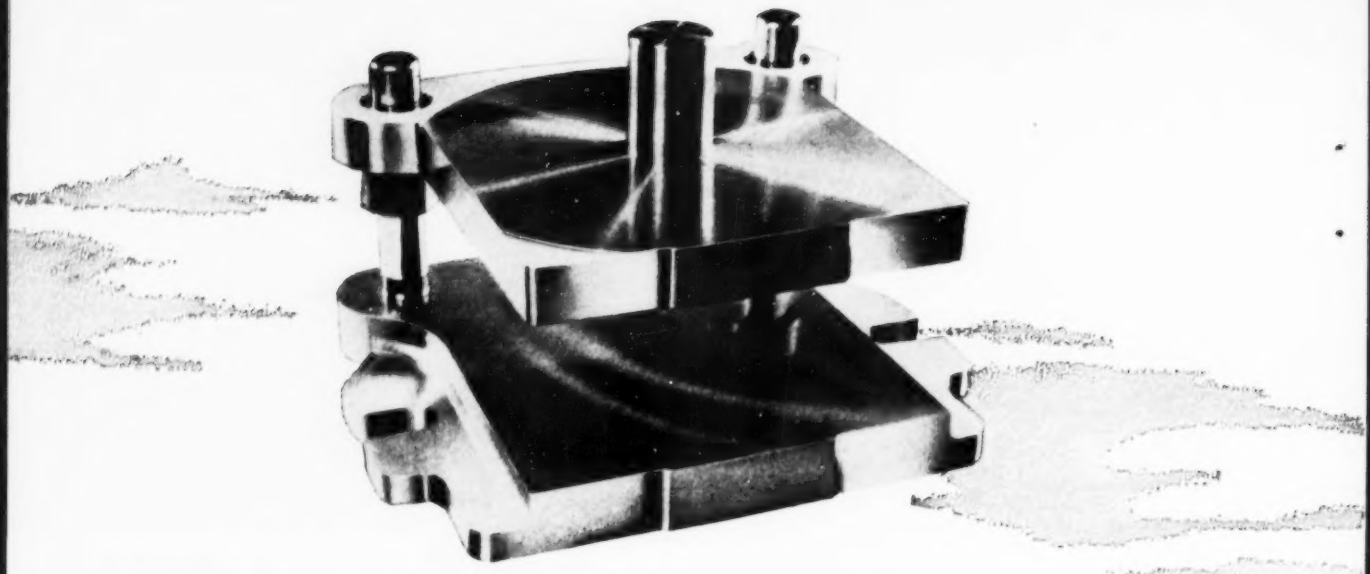

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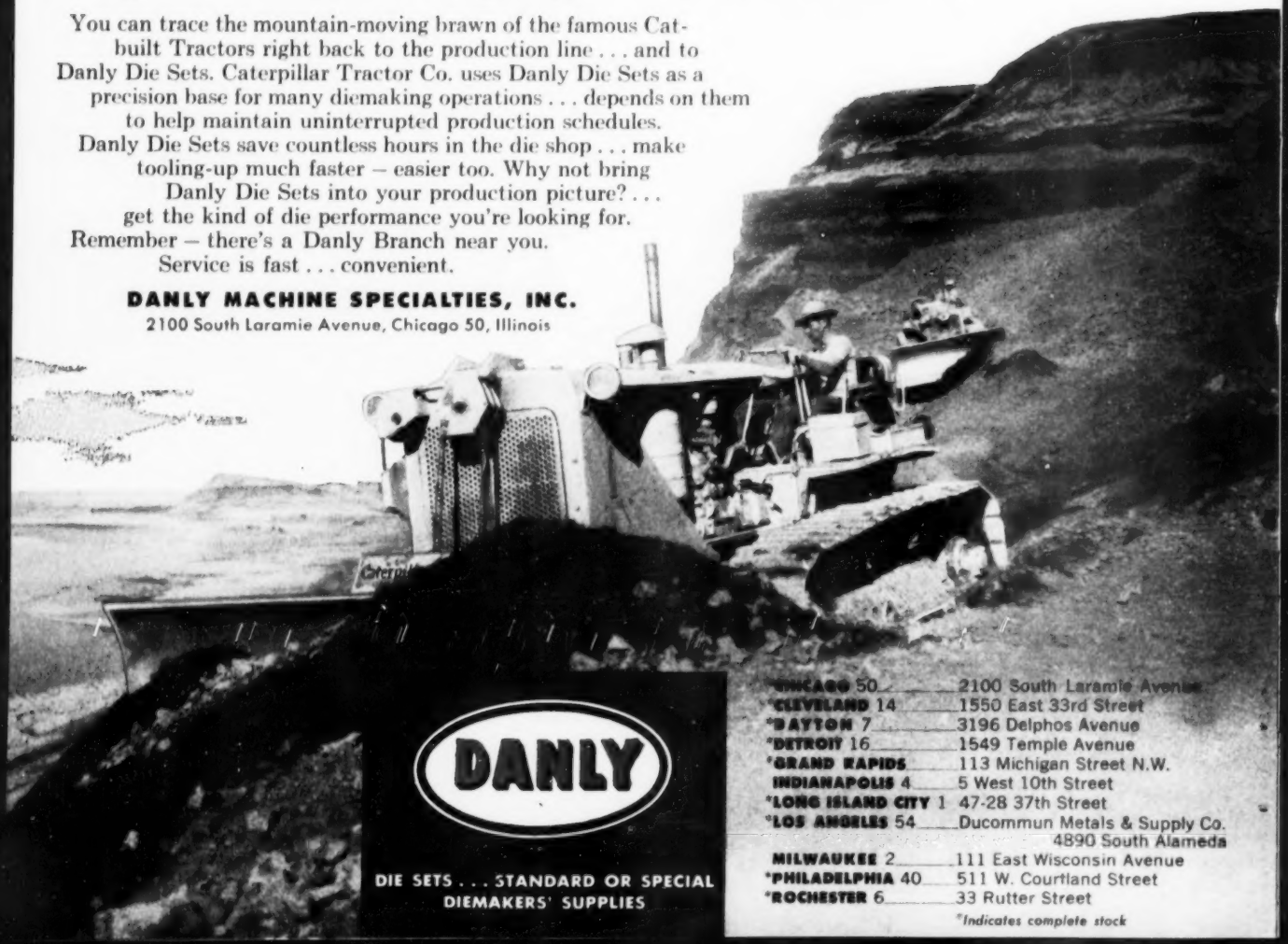

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INDIANAPOLIS 4	5 West 10th Street
*LONG ISLAND CITY 1	47-28 37th Street
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MILWAUKEE 2	111 East Wisconsin Avenue
*PHILADELPHIA 40	511 W. Courtland Street
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SPOT NEWS of Metalworking

- **US press imported into Northern Ireland for forming plane parts** has been idle for eight months because two rival unions could not agree upon the type of worker to operate it. Unions finally have reached a compromise and the press went into use last month.

- **Shortest Air Force contract on record lasted just one day.** Pacific Airmotive Corp received a $3-million-plus contract to overhaul military aircraft on June 29. On June 30, it was cancelled under the new Air Force cutbacks.

Renegotiation of government contracts will be extended beyond the cut-off date of December 31, 1953, before Congress winds up this session. Both Rep Dan Reed of the House Ways and Means Committee, and Rep Herman P Eberharter have submitted bills extending provisions of the 1951 Renegotiation Act up to December 31, 1955.

- **Soviet-type planers, vertical lathes, 3000-mm shears and 5000-mm thread millers** are among the new products to be produced this year in Red China, according to claims made by Chia To-Fu, vice chairman of the National Financial and Economic Committee of the Peoples' Republic. Plans call for building an auto factory and plants making heavy machinery, locomotives, cutting tools, pneumatic tools, measuring instruments, electrical machinery.

- **A 1-in. cube, weighing only 1 oz, delivers 3 cfm of air.** Intended for circulating air and cooling electronic parts and equipment, unit contains tiny motor and blower, has a universal mounting.

- **Only remaining material controls** are on primary nickel, nickel-bearing stainless steel, high-nickel ferrous and non-ferrous alloys; permanent magnets containing nickel; nickel-silver, columbium-tantalum steels, heat-resistant chromium or chromium-nickel alloy iron or steel; and diamond grinding wheels. Users need NPA or defense procurement agency priorities to buy these materials.

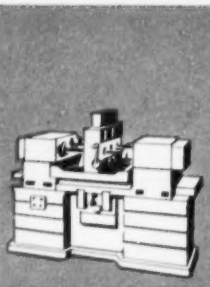
- **Soviet machine welds metal rods up to 100-mm diameter into continuous lengths** for reinforced concrete construction, it is claimed by Russian officials. The MCG-500 is said to weld up to 30 rods per hour, a considerable increase over hand arc-welding.

- **New lightweight diesel engine,** originally developed as an auxiliary powerplant for bicycles, weighs 11 lb, develops ¾ hp, and will do 300 miles on one gallon of either gasoline, kerosene or diesel fuel oil. Absence of electrical system eliminates failures due to fouled plugs or moisture.

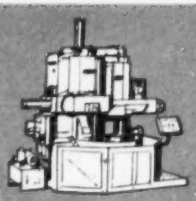
Under the drastic new Ordnance Department cutback in plant and production of military tanks and vehicles (see page 161), idle machine tools will be mothballed in production "packages" (all the tools necessary to produce a specific item.) One thing is sure, the machine tools won't be thrown on the market. But it is possible machine tools may be leased in instances where the tools are on a line and the cancelled-out contractor can use them for civilian production.

- **A "one-machine precision machine shop" has been developed by the British.** Machine does horizontal and vertical milling; internal, external and surface grinding, tool grinding, precision boring, slotting turning, band sawing, and a half-dozen other jobs. Powered by a 1½-hp motor, the unit has a range of 24 speeds, from 65 to 2800 rpm.

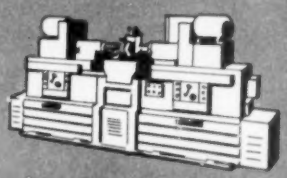
- **American wage earners can expect to increase their buying power** on an average of 2.5 to 3% a year for the next decade or two, according to a study recently completed by the Twentieth Century Fund.



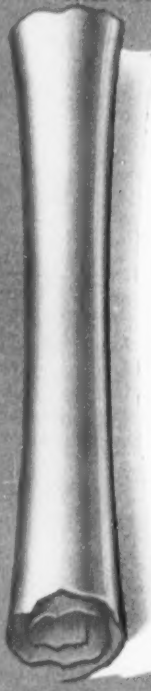
STYLE 17 PRECISION BORING MACHINE



VERTICAL PRECISION BORING AND CONTOURING MACHINES



TWO-WAY PRECISION BORING MACHINE



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ON ITS 50TH ANNIVERSARY

and sincere best wishes to the third generation

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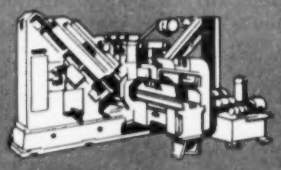
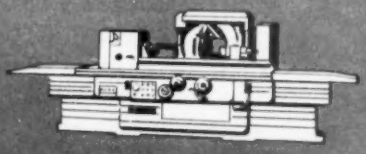
XLO

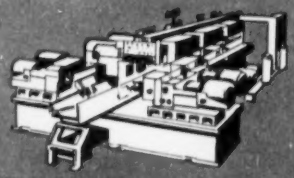
EX-CELL-O PRECISION



STYLE 63 ANGULAR CYLINDER BORING MACHINE



STYLE 36 PRECISION THREAD GRINDER



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53-39

Washington

Commerce Secretary Weeks' plan to convert NPA from an emergency controls agency into a peacetime "business services" bureau is in a rut.

Agency was supposed to (1) have about 20 industry divisions to act as a Washington clearing-house —or "friend in court" for important industries, and (2) pull the strings on remaining priority and allocation controls. But now, exact functions and organization of the proposed agency have still not shaped up.

For one thing, the Justice Dept wants to make a closer study of whether the Industry Advisory Councils, on which much of the new agency's work would hinge, would violate anti-trust laws. Like the Interior Dept's National Petroleum Council, Commerce's councils would have privately-paid staffs, and have a big say on government policy affecting their industry.

Representing all segments of an industry, the councils would be broader than NPA's old Industry Advisory Committees. For example, NPA's Motor Vehicle Division had IAC's for passenger cars, trucks, automotive replacement parts, maintenance equipment, etc. The new agency would have one big council for the motor vehicle industry as a whole.

Justice doesn't consider NPC an anti-trust threat because it's the only one of its kind and can be watched closely. In Justice's eyes, however, Commerce's intention to have about 20 councils creates a new problem.

Another snag in Weeks' plan: outside of steel and aluminum, most industries have been apathetic about the whole scheme. They've failed to name people for rotation service with the new agency's industry divisions (metalworking is a notable exception), and have shown little interest in the industry councils. In general, the attitude seems to be: the less we have to do with government the better.

But Weeks is confident his new agency will be able to open up shop next month. NPA's remaining 400 employees would presumably be its nucleus.

• • •

The government's budget situation has proven to be a sleeper that has brought the Eisenhower administration up short. The administration's tax experts over-estimated the government's income from taxes by about $2 billion.

In view of the emphasis on ending of deficit, the unexpectedly large deficit for the year that ended June 30 has set the new team's sound-dollar, budget-balancing, tax-cutting program back in a way that really hurts.

The non-appearance of the $2 billion in tax income —making a deficit of $9.4 billion—is something the officials can't really explain. That means that they really don't know for sure how well they're going to be able to do in the year ahead either.

Results could well be twofold. (1) Increased pressure from the Eisenhower team to get the President's tax program out of Congress—that includes extension of the present corporate income tax rates, and extension of present excises, particularly. (2) An even harder push for budget-cutting next year, including bigger cuts on any military items that could be labeled as "less essential."

• • •

Excess Profits extension wouldn't be affected, one way or the other. Continuation of the EPT through December seems assured. But whatever Congress does or does not do about taxes in the session beginning in January, further continuation of EPT is the least likely. In fact, only outbreak of another war could cause it to be continued or re-enacted.

• • •

Riots in Berlin and Poland have Pentagon planners worried. They fear France and other European countries may use these as evidence there is a lessening of the Russian threat to Western Europe, therefore they can cut their military programs.

That's why military men like retiring General of the Armies Omar Bradley are now cautioning that the Politburo may launch a war to unify satellites and the Russian people in a common cause. The brass doesn't really believe this, but they are counteracting the less-threat talk which could destroy the entire arms build-up picture in Europe that's now nearing goals.

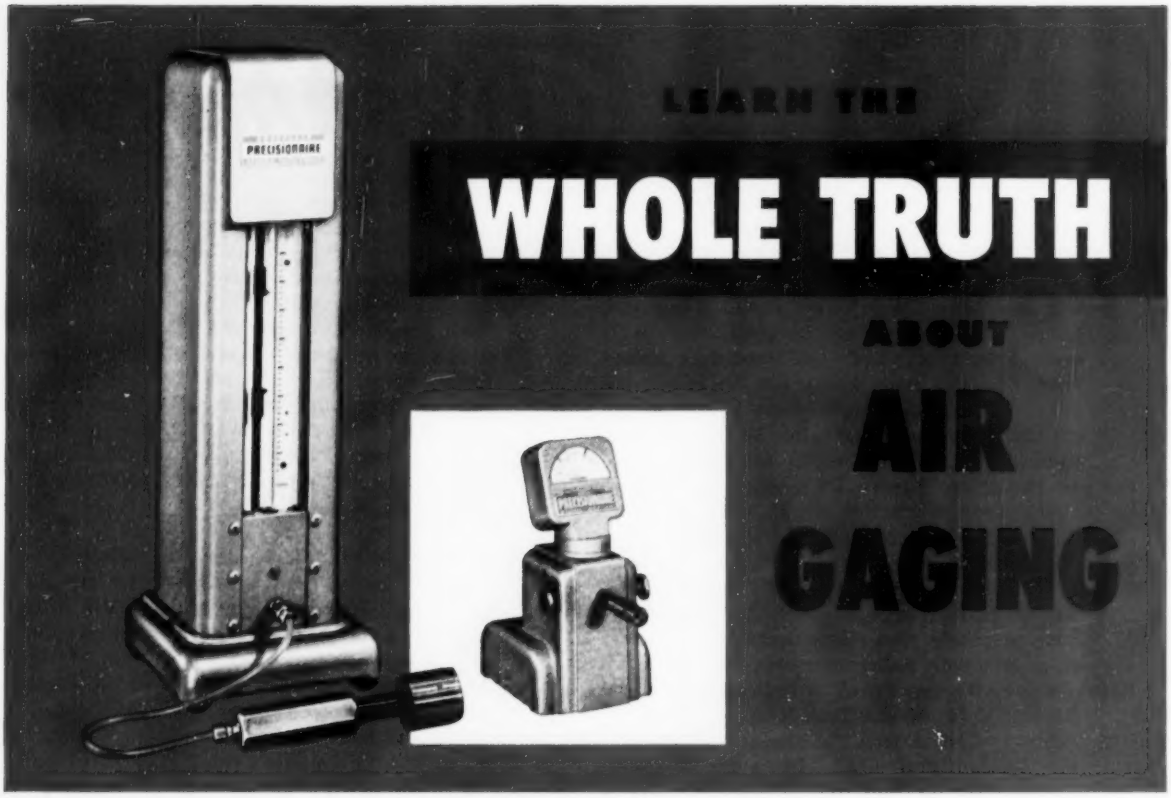
• • •

Chances are that fiscal 1954 is the last big year of foreign aid. There is widespread sentiment in Congress not to vote any additional funds for foreign military or economic aid after this year, except to wind up the program. The fact that the US has spent over $30 billion since the war in foreign aid is now beginning to sour with the voters.

• • •

The new Joint Chiefs plus all the top Pentagon civilians meet with Wilson and members of the National Security Council at Quantico, Va, this week (July 23-26) to get a full briefing on the world situation. It's the first such meeting held, and Wilson plans to spell out his policies, particularly on production base and unification.

The idea is to get all top management of the Pentagon on the same side of the fence. That way, there will be less conflict when it comes to settling budget and assignment problems.



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Detroit

The tool and die shop strike in Detroit has resulted in the quiet withdrawal of a goodly amount of work in process, both duplicate tooling for 1953 models and new tooling for 1954s.

For General Motors, much of this work has been put into the tool rooms of Fisher Body and the various divisions, thereby adding to current pressures. They were busy enough getting ready for 1954 before they were burdened with the additional work.

On that score, it should be noted that Detroit's grapevines are buzzing with word that the top-priced lines of General Motors—Cadillac, Buick, and Oldsmobile—will have brand new body shells next year. This will create a definite stir, to say the least.

Plymouth, more or less quiet saleswise in the last year or two, is making a determined bid for more business by planning to lengthen its wheelbase next year. As one automobile industry expert put it: "There just aren't any small cars anymore. Even the 100-inch wheelbase jobs—Hudson, Nash Rambler, Henry J, and the others—are bigger than the small cars of years gone by."

The auto industry's biggest make-or-buy decision in some time has come out of Chevrolet. That GM division is going into the frame business; by 1954 it will be building 25% of its frames in a new 600,000-sq ft stamping and frame plant at Flint.

Some 850 jobs will be provided. Heavy stampings like hoods and fenders will be moved from downtown Flint to the new plant. Light stamping production will continue downtown.

Present frame suppliers were notified of the move in advance. They were told that Chevrolet expects enough expansion in its output the next few years that it will buy as many frames outside as it has in the past, despite the fact that it will be making frames itself.

Chevrolet is probably the only manufacturer assembling its own frames. A O Smith and others ship frame units unassembled. They are then put together at Chevrolet manufacturing plants, reducing freight car requirements to a fourth of what they would otherwise be.

• • •

Passenger car and truck profit margins are being reduced materially as a result of the recent wage increases. Not only are direct wages of workers in automotive plants involved—steel prices are being increased as a result of the steel mill wage boosts. This has caused enlargements of prices all along the line.

Steel price increases come on the heels of recent advances in extras. Some new extras have been put on, others have been enlarged.

Buyers, incidentally, say there is no complete uniformity between companies on extra schedules. Each company has set up charges on the basis of its own situation, rather than that of industry practice.

This brings to mind a problem that burdens some military producers, who see little chance of correcting it as long as present military procurement regulations are unchanged—suppose a company buys steel from five different sources, thereby paying five different prices, because not only extras are involved but also shipment distances from mills and other factors. General company practice has been to lump all these steel charges together in one cost figure. Under military regulations, however, specific steels going into armament goods must be segregated costwise and accounted for on that basis. It simply makes the job a little more complex. And it seems nothing can be done about it at this point.

Steel supplies seem to be loosening somewhat, although they are still quite a way from fulfilling demand. However, the intensive demand of a few months ago is quieting down.

Everybody is likely to complete the conversion deals he now has, but the writing of new ones is not likely.

• • •

Production is still humming along. July volume is moving at better than 170,000 car and truck assemblies a week, US and Canadian plants included—a total that will bring out somewhere around 750,000 units. That's terrific in any language. August and September will be on a somewhat reduced plane, however.

Today's high production rates follow the best first half in automotive history. About 4,180,000 cars and trucks were built in all plants. That's a good 40,000 or so above the previous record, set in 1951.

Don't look for the record-setting to continue, however. Last half schedules will not equal those just made. Reasons: gradual buildup of field stocks at retail level; shutdowns for changeovers to 1954 models.

Dealers are beginning to fret about that buildup, incidentally. They're particularly concerned about the sagging price levels on used cars. Second-hand prices and sales are both putting a drag on prospects.

• • •

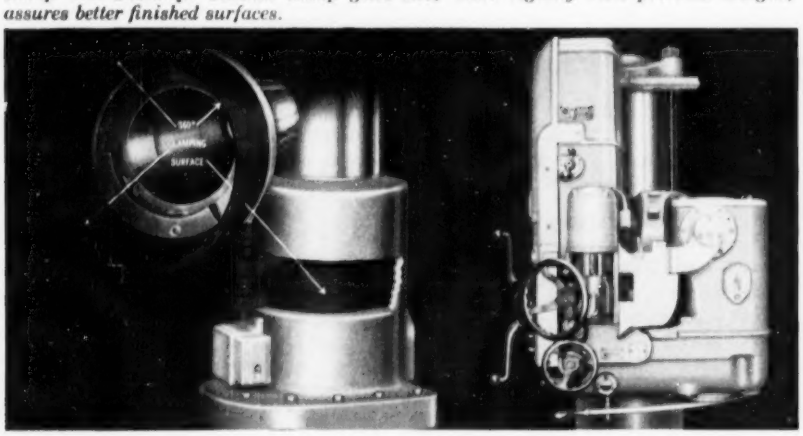
Postscript: Ford has definitely decided to build another stamping plant. Negotiations have been unfolding for purchase of land at Cleveland for this operation. Evidently Ford likes Cleveland—it has already located an engine plant and a new foundry there.

Only ONE can be called the Finest: Carlton

...here's another good reason why:

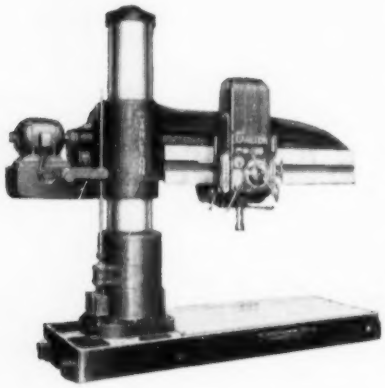
3-unit power clamping

COLUMN AND HEAD CLAMP *coupled together so that one pushbutton operates both units for clamp and unclamp. Column clamp gives 20% more rigidity than previous designs, assures better finished surfaces.*



ARM CLAMP *and unclamp automatically controlled from the raise, lower and stop pushbutton of the elevator unit.*

Easier, Faster, More Productive, Cheaper to Operate



Positive and powerful, this exclusive 3-unit power clamping puts precision into the radial drill.

Pushbutton controlled, it's easy and fast to clamp and unclamp, resulting in more production.

Electric power is used only to clamp and unclamp; mechanical power holds units in position while drilling. Results in most economical operation.

Carlton customers—hundreds of them—bought their Carlton radial drills solely on the strength of this efficient clamping. The many other advantages they enjoy—including the exclusive pushbutton control, low hung drive, modern lubrication—explain in part why Carlton is the No. 1 radial choice. But you'll want to know "the hole story"—prices, deliveries—so write or wire us today.

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO.

Machine Tools

Just because the $500 million for long lead-time production equipment is whizzing its way through Congress, don't expect a flood of machine tool orders from the government.

The $500 million, in the first place, is for facilities. That means buildings and tooling as well as machines. What's more, Secretary Wilson has a lot to say about how the money is to be spent and whether it is used at all.

Whatever portion of the $500 million should go for machine tools, it is unlikely that any orders will be placed this calendar year. In any event, you had better not count on it.

For complete story on the $500 million plan and what the services would like to buy with it, please turn to page 165.

• • •

The so-called "D" list of critical machine tools is being reviewed by NPA. Since the list was first established, many items have become less critical and a few are more critical.

The list as it now stands is not realistic of today's changed conditions, hence the review.

Chances are that the composition of the list will be changed in the near future. But the list is not likely to be abolished.

• • •

Pool orders are under continuous review at NPA. Every contract for special machines is being examined, Pentagon being in on the consultation. If any "specials" are not needed and have not been put into production by the builder, they will be cancelled.

NPA is deciding upon its own, without specific reference to Pentagon, what should be done about pool contracts for standard machines.

• • •

Final completion date of all pool orders is April 1954. General Services Administration now has taken over 379 machine tools produced on pool orders for which there are no immediate customers.

There is no change in the earlier estimate that the pool-contract program will wind up with about $15 million of machine tools in GSA's custody.

That is a very small percentage, in view of the fact that some $1.5 billion of pool-order machines will have been built.

• • •

Disposal of the Central Inventory of production equipment has not yet been decided upon. But it looks like Pentagon will walk off with the major holdings, taking all the machines owned by the three services plus the national industrial equipment reserve.

Anything left over will stay with NPA (now BSA). Keep in mind, though, that NPA may acquire GSA's holdings of surplus machines eventually.

• • •

Congressional delay in making fiscal 1954 budget appropriations forced a drastic slash in NPA personnel to a total of 408 people for the month of July. That meant that the Metalworking Equipment Division was cut to 21, or about one-half the anticipated size.

• • •

Turkish Purchasing Commission in this country has completed the placing of orders for machine tools and heat-treating equipment for manufacture of 105-mm shell at a Turkish arsenal as part of the US offshore procurement program. Members of the Commission have just returned to Ankara.

• • •

Hellenic Powder & Cartridge Case Co in Greece is reported to have received a contract for 105-mm shell, but it is not known whether it will buy shell-making machinery in this country.

Some six months ago this company bought a completely tooled-up production line for 3½-in. rockets from the Keddy Co, according to reliable sources. The line was shipped to Greece to be set up there.

• • •

Tip-off of what the armed services intend to do with their holdings of machine tools that become surplus is given in the action of the Army Ordnance Corps.

When it shuts down tank and vehicle plants, it will hold all machine tools. None will be put on the commercial market, as they were after World War II.

Most of them will be retained as a "package" and will be stored in buildings or warehouses to be erected near present plants ready for activation in an emergency. Some may be leased. For full story on Ordnance plans, see page 161.

• • •

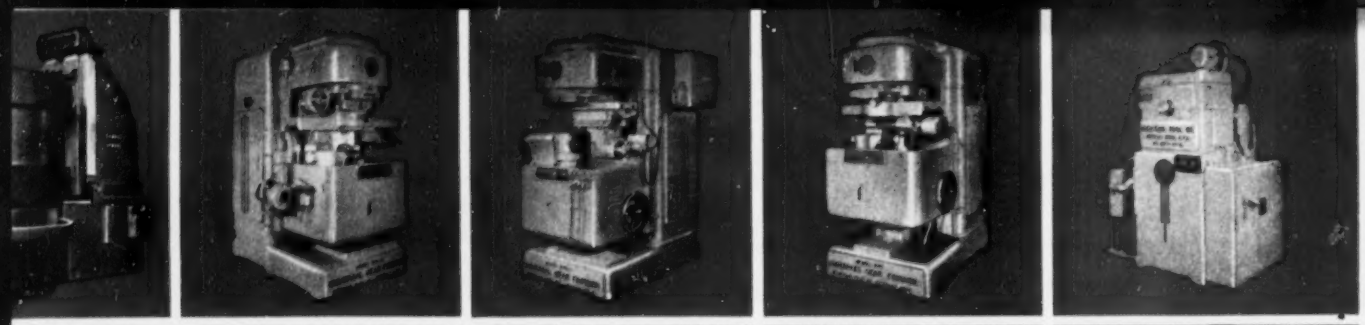
Fiat at Turin, Italy, giant manufacturer of automobiles, will spend about $35 million to tool up for production of complete F-86 (North American) fighter planes.

While these planes will be assembled at Fiat and a considerable percentage of the parts and components also will be produced in the Fiat organization, a substantial amount of work will be subcontracted to other Italian companies.

Some of the $35 million for tooling is likely to be spent in the United States for machine tools. But no one knows what percentage of the total will thus be spent.

Fiat also is in the midst of a program, previously reported here, for producing parts for a turbojet engine patterned after the Allison. Tooling for this job adds up to $3.5 million.

BSF



MATCHED TOOLING for your GEAR LINE

At Michigan Tool, gear cutting and finishing tools for the same gear are MATCHED—matched to each other, matched in performance.

Matched tooling means greater assurance of accuracy throughout the life of tools. It means more gears per tool and lower tool cost per gear.

When your tools are *Matched*, they work in harmony, each with the other.

Michigan Matched gear cutting tools include ground and accurate unground hobs, shaper cutters, Shear-Speed cutting tools, gear finishing cutters or racks, also gear laps.

Michigan's own laboratory control of the high speed steels and heat treatment of the high speed steel tools assures the users of consistent highest quality in his *Matched* gear tools.

Insist on *Michigan Matched* Gear Tools for your gear production line.

GEAR PRODUCTION HEADQUARTERS

MICHIGAN TOOL COMPANY

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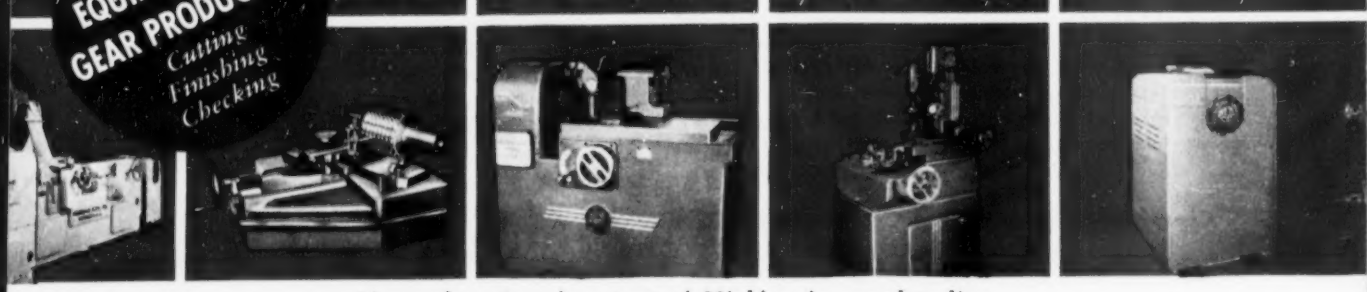
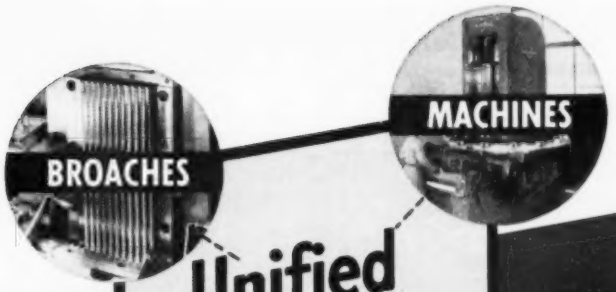
COMPLETE EQUIPMENT for GEAR PRODUCTION
Cutting
Finishing
Checking



Shown here is only a part of Michigan's complete line



Unified Broaching

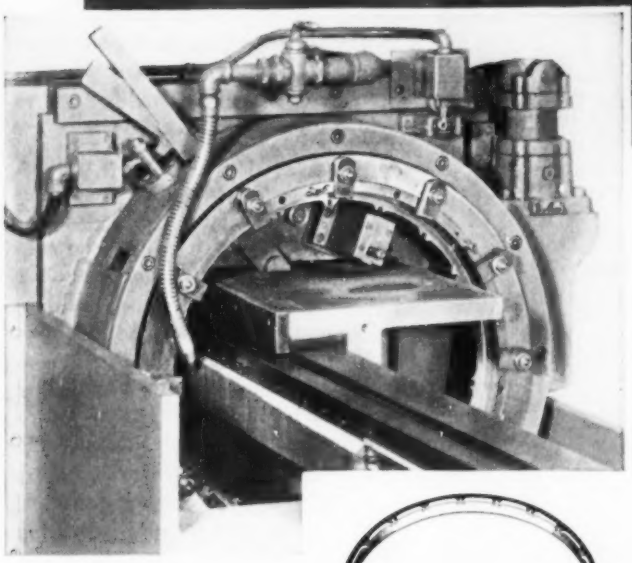
Methodized Broaching

the COLONIAL method

At Colonial, experience, imagination and competence are applied

1 to the design and manufacture of each of the individual components of a complete broaching installation, and

2 to the effective combining of ALL components into a completely UNIFIED BROACHING installation—making them work as a "team."



2 Colonials Broach JET BLADE SUPPORTS

Heat and corrosion resistant steel 22¼" I.D. jet engine blade supports, are broached on internal contours on two 10-ton 90-in. stroke standard Colonial horizontal machines at 3 per hour. 18 passes are required per machine. Metal approximately ¾" deep, 3½" wide, and ½" thick is broached in two passes.

Machines, broaches, fixtures, etc., were all designed by Colonial as a UNIFIED BROACHING INSTALLATION.

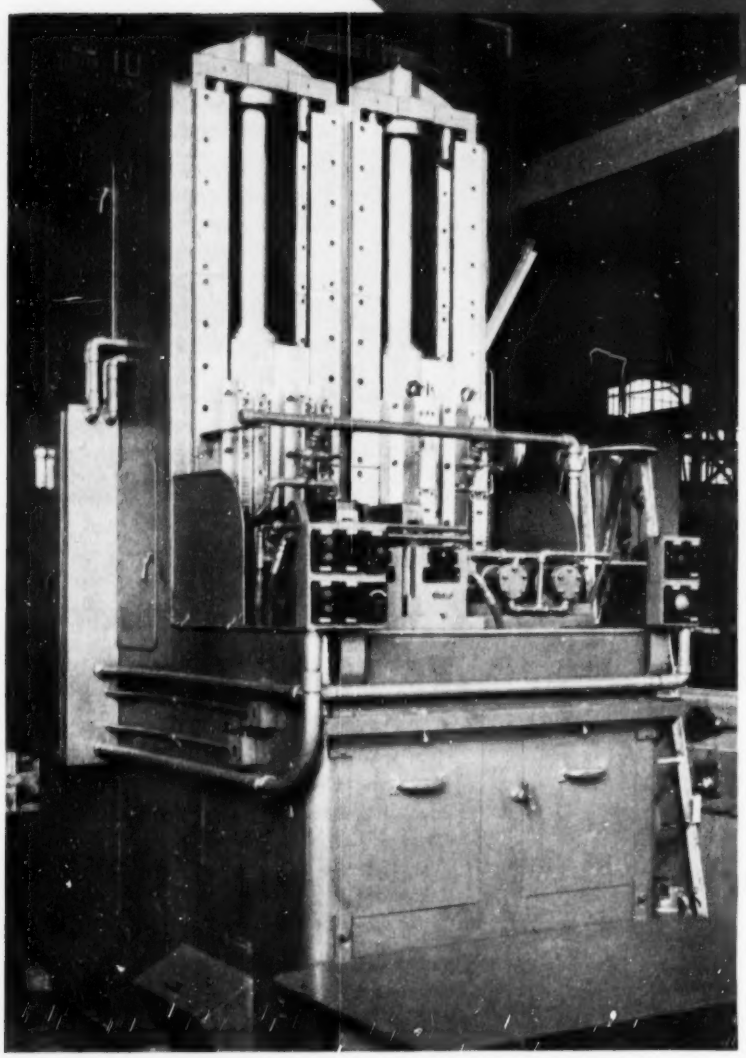
WHAT'S AHEAD IN BROACHING?

Keep up with the latest developments: Read "Broaching News". We will be glad to see you get it regularly if you will drop us a line on your company letterhead.

PIONEERS OF H.S.S. BROACHING

COLONIAL BROACH CO. DETROIT 13

WHY AMERICAN BROACH USES TEXACO



THE American Broach & Machine Company of Ann Arbor, Michigan, a division of Sundstrand Machine Tool Company, uses hydraulic machine tools to make its own famous line of hydraulic broaching machines and broaching tools. And in these hydraulic machine tools, the hydraulic medium is *Texaco Regal Oil (R&O).*

Why does American Broach use Texaco? Because *Texaco Regal Oil (R&O)* gives them these benefits –

– freedom from rust, sludge and foam
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Texaco Regal Oil (R&O) is turbine-quality oil *improved* by special additives and processing. Tested against ordinary turbine-quality oils, it shows *more than ten times greater oxidation resistance* and far superior rust- and foam-preventing ability.

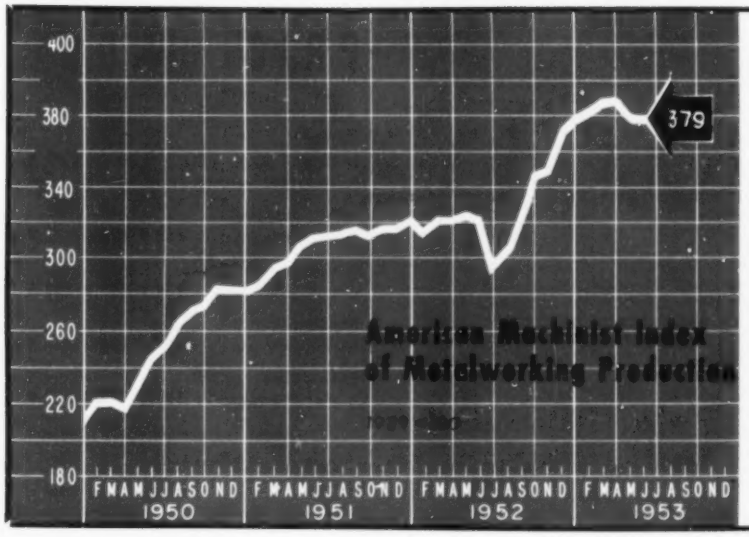
There is a complete line of *Texaco Regal Oils (R&O)* approved by leading hydraulic manufacturers. Let a Texaco Lubrication Engineer help you select the one best for your equipment and operating conditions. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Regal Oils (R & O)
FOR ALL HYDRAULIC UNITS

Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	JUNE '53(*)	MAY '53(p)	APR. '53(r)	JUNE '52
Tot. Index..	**379**	**380**	**382**	**322**
Machinery	**341**	**345**		**316**
Electrical Machinery	**423**	**428**		**349**
Autos	**321**	**321**		**228**
Other Transportation	**605**	**603**		**538**
Other Metalworking	**369**	**370**		**306**

(*) Estimated (p) preliminary (r) revised

Metalworking production will stay high this month. It won't be up to June's dizzy pace, because of vacation shutdowns. But July promises to be the best summer month by far since World War II.

Automobile assemblies will aid the month's record. Suppliers to the motor car industry have not felt as yet any decline in orders. Settlement of the Borg-Warner strike, in fact, has caused some parts people to step up operations.

• • •

Hardly anyone believes, however, that Metalworking will stay up at a point rivaling this year's spring peak. Production will be good through the summer and fall, but a paring down of schedules is almost sure as the year goes on.

Some scaling down of armament work looms. Tanks and military vehicles are to be affected. Even jet engine output is not what it was.

Defense production, nevertheless, promises to be a main factor in supporting Metalworking the last half of the year.

• • •

Cutbacks in military production have not been seriously felt yet in most cities.

In Cleveland, as a sample, a home appliance maker had to curtail operations as a defense subcontractor but its discharged workers were quickly employed by other companies.

Two large aviation parts makers in Cleveland have leveled off output and become selective in hiring people. Both have comfortable backlogs but are starting selling campaigns again.

• • •

Steel mills have full order books in most cases for third quarter. Sheet and strip continue tight, with a few big users still taking in conversion steel or foreign tonnage.

Steel warehouses are enjoying excellent business. They are getting their share of steel in a wide range of products, a pleasant change from the shortages that formerly prevailed.

Huge stocks of nickel-bearing steels are bothering steel jobbers who cannot move them in the market because of government restrictions on commercial sales.

Inventories in general increased at a faster rate in Metalworking in the second quarter than in the first. But buyers are more cautious now.

• • •

Metalworking is still thriving on the West Coast. Manufacturers in the San Francisco area look for business to stay up well in the last half.

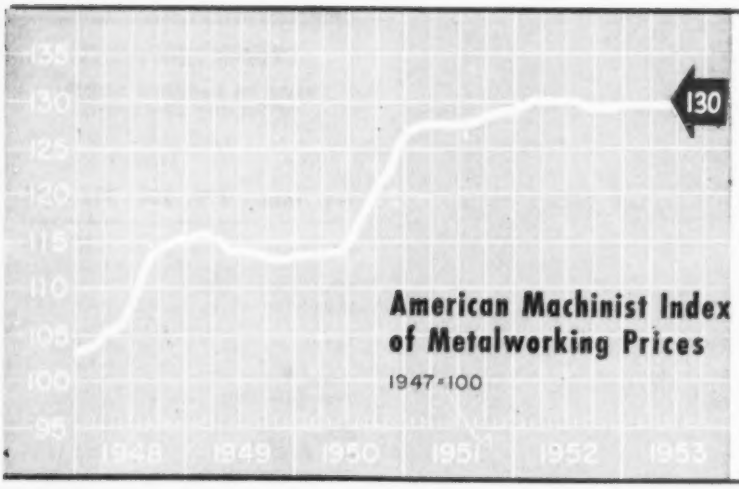
Industrial plants around San Francisco employed in May the largest number of workers for that month since World War II.

Los Angeles metalworking companies are uncertain about the outlook, with a mixture of optimism and pessimism. Defense work has dropped considerably. Civilian-goods production, by contrast, is showing strength.

Typical Los Angeles comments: A ventilation equipment maker reports his volume up 14% above the 1952 level, but expects sales to sag soon. An electric motor builder has done a bit better this year than last and feels that demand will continue brisk. A trailer maker says that defense work is half what it was, and civilian sales are up only 5%.

Metalworking employment in southern California was up to 543,900 in May, a nice gain over 480,900 in the same month a year ago.

Gaging Business



PRICE INDEX

	JUNE '53(*)	MAY '53(p)	APR. '53(r)	JUNE '52
Total Index	**130.2**	**130.2**	**129.9**	**129.4**
Metalworking Machinery	**138.9**	**138.6**	**136.7**	
Other Machinery exc. Electrical	**134.1**	**133.8**	**132.5**	
Electrical Machinery	**127.3**	**126.3**	**124.9**	
Fabricated Metal Products	**127.5**	**127.3**	**127.9**	

(*) Estimated (p) preliminary (r) revised

Gross National Product is running 7% ahead of last year. And industrial production is 18% above what it was a year ago.

But there's a reason why production is higher. Last summer, steel was on strike and its low output affected most industrial production.

• • •

Inventories are staying at a high level — more than $45 billion in May. And durable goods inventories increased $300 million during the month, as against a $100 million increase in non-durable stocks.

But manufacturers shipped 2% less in May, although shipments ran $3 billion ahead of a year ago.

Total new orders stayed the same in May as in April. Durable goods orders increased $300 million, but this was offset by a decline of the same size in non-durable orders.

Backlogs dropped for the third consecutive month. Current level is about $71.6 billion, compared with 1952's peak $75.7 billion.

Capital goods manufacturing is the only major industry showing a downtrend in recent months. Employment in this industry was cut by 25,000 workers between March and May. Most severely affected: farm implement manufacturers.

• • •

Overtime continues in many industries, with factory workers averaging 40.6 hours per work week —nearly a half hour more than last year.

Hourly earnings of factory workers have been relatively stable since the beginning of the year. But latest available figures do not reflect the recent steel and auto wage agreements. Average hourly earnings in manufacturing may be up 5¢ by year's end.

• • •

Steel output of 58-million tons in the first half set an all-time record. This means that the industry operated at about 100% of capacity for the period.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	261.1	264.2	217.2
Steel ingot operation (thousands of tons)	3,132	2,069	295
Electric power output (million Kilowatt hours)	7,970	8,446	6,478
Production of automobiles and trucks	138,447	173,702	86,052
Engineering construction awards (*Eng. News-Record*—millions)	$191.6	$256.2	$381.7

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1935-1939 = 100)*	241	241	204
Index of durable manufactures production (1935-1939 = 100)*	319	320	247
Durable goods manufacturers' sales, millions*	$13,397	$12,821	$11,310
Electrical machinery manufacturers' sales, millions*	$ 1,342	$ 1,347	$ 1,036
Other machinery manufacturers' sales, millions*	$ 2,193	$ 2,137	$ 2,079
Durable goods manufacturers' new orders, millions	$12,678	$12,023	$12,443
Electrical machinery manufacturers' new orders, millions	$ 1,627	$ 1,096	$ 1,289
General machinery manufacturers' new orders, millions	$ 2,115	$ 1,894	$ 1,934

* Seasonally adjusted.

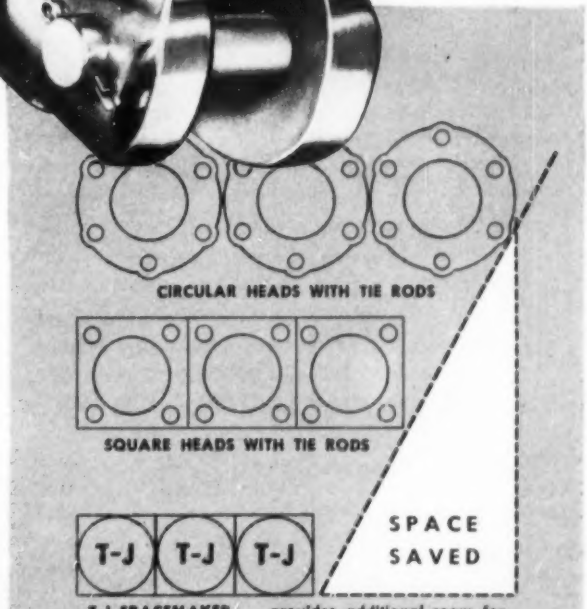
LESS SPACE!

extra high safety factor!

NEW T-J Spacemaker AIR CYLINDERS

These new T-J Cylinders *save up to 40% in mounting space*—with streamlined design that eliminates tie rods. They're *super rugged*—extra high safety factor . . . solid steel heads . . . heavy wall, precision honed, hard chrome plated, seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, hi-tensile, hard chrome plated piston rod.

Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . for pushing, pulling, lifting, clamping or control jobs. T-J dependability. Write for bulletin 8152. The Tomkins-Johnson Co., Jackson, Mich.



T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

T-J

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RIVITORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . CLINCHORS

37 YEARS EXPERIENCE

Tap . . .
Thread . . .
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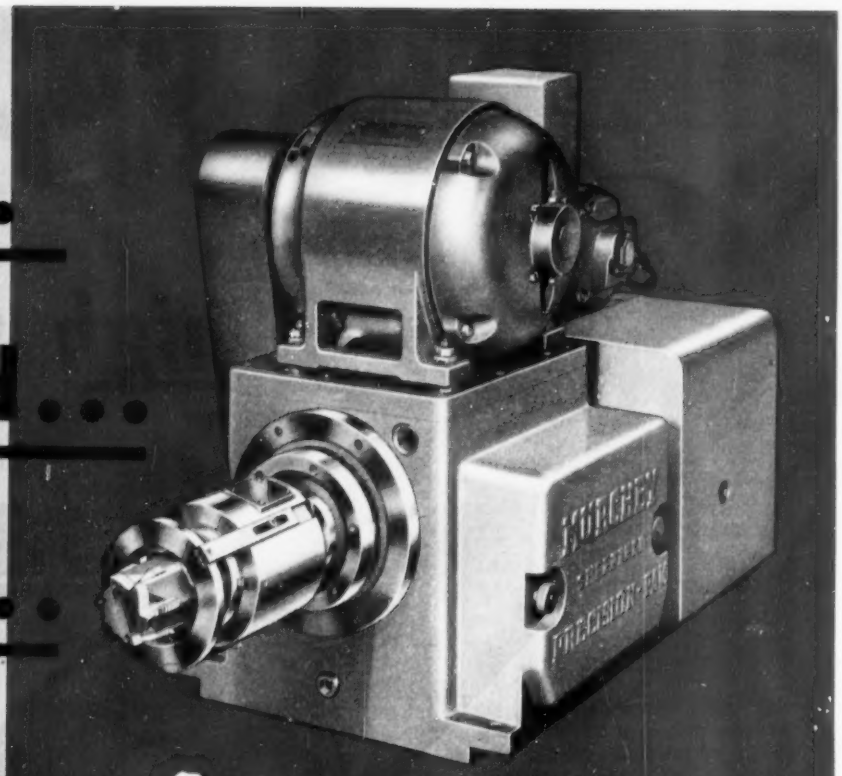
Ream . . . *Automatically*



Precision lead, automatic cycling, and small, compact size are only a few of the outstanding features on the new Murchey PRECISION-PAK. This self-contained, individually powered threading unit is used for high production threading of projectiles, valves, aircraft and automotive parts; or for boring and reaming.

Only 40" x 26" x 20" it mounts in any position and can be used in multiples or as a double-end machine.

Precision lead (within .0005") is obtained by a precision ground lead screw and nut. There is no intermediate mechanism—no backlash, no lost motion —AN EXCLUSIVE FEATURE.

The PRECISION-PAK can be synchronized with a work fixture for completely automatic high production.

Capacities:

Internal Threads	1⅛" to 4"
External Threads	¾" to 3½"
Internal Pipe Threads	1" to 3"
External Pipe Threads	⅛" to 3"
Spindle Travel	½" to 4"

Write for Catalog No. PP-353

MURCHEY DIVISION
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Lower Cost per Thread MURCHEY
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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

What About Machinery Exports?

Too many capital-goods producers look upon export business with indifference or with defeatism.

When business is good at home, some manufacturers regard the foreign market casually and thumb their noses at prospective customers abroad. But when domestic demand slackens, they suddenly acquire a passion for expanding export sales.

CERTAIN OTHER MANUFACTURERS view world markets with a gloomy eye. They appear licked before they start. They cite the deadly price competition from foreign companies producing goods at low labor cost and underselling the US product.

Both of these Jeremiahs should take cheer from the astonishing figures turned up on the export market for capital goods by the Council for Technological Advancement.

"Machinery and equipment" comprise the largest group of commodities shipped to foreign customers. They make up 20% of total US exports and almost 25% of nonmilitary exports.

What's more, machinery and equipment shipments abroad have increased much more rapidly than exports as a whole. Capital goods now represent one-fourth of total exports. They used to be only one-sixth.

To put it another way, the physical volume of machinery and equipment sent abroad last year was three-and-a-half times what it was in 1938. It is true that exports are off this year, but capital goods have dropped far less than exports in general.

Look at a few of the high spots in the Council's current bulletin: Latin America is the leading market for capital goods (though Europe still is No. 1 in "metalworking machinery"). It is absorbing more than 30% of machinery and equipment exports.

Canada is the fastest growing market for capital goods and today is second only in size to Latin America.

The socalled "less-developed" countries offer a major potential market in foreign trade, as contrasted with the highly industrialized but also highly competitive countries.

WHAT THIS RECITAL of facts makes obvious is this: Export business in capital goods is too important to be treated with other than respect at all times.

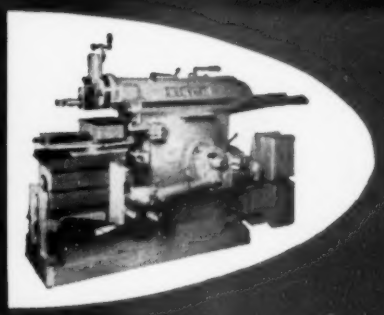
It is not something to be turned off and on at management's whim. It is not the theme for a dirge. Its potential is tremendous if properly and assiduously developed.

Export sales represent, as the Council points out, a sufficiently large slice of total capital-goods business to make them "a prerequisite to healthy employment and profit conditions."

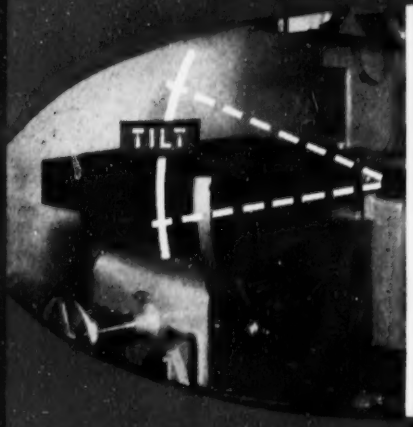
They should be so regarded and management should shape its plans accordingly.

Burnham Finney

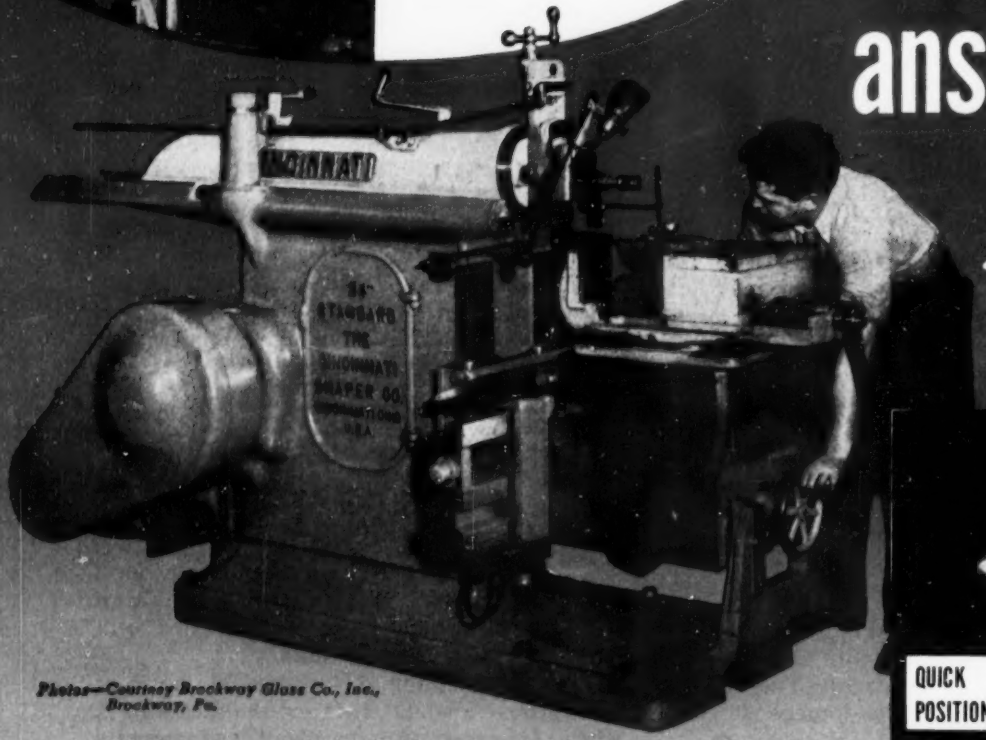
a CINCINNATI Shaper...



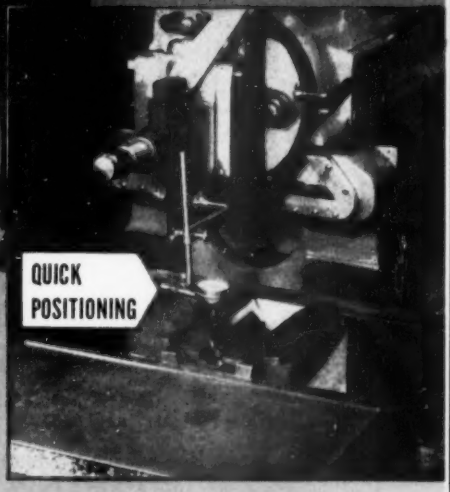
with tilting table...



was the answer!



Photos—Courtesy Brockway Glass Co., Inc., Brockway, Pa.



Glass molds are quickly positioned for skim cut with the Cincinnati tilting table.

Glass molds at the Brockway Glass Co., Inc., must be produced with very close fits on matching surfaces, and with minimum metal removal.

A Cincinnati Shaper, with special tilting table, positions the work so quickly and accurately that "flash" in molding is reduced, setup time is cut, and the useful life of molds is lengthened through the minimum metal removal.

A versatile Cincinnati Shaper, with simple fixtures, low cost tooling and accurate performance, may reduce costs in your shop.

Write for Cincinnati Shaper Catalog N-5.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

MANY PRACTICAL IDEAS for employee efficiency and comfort are incorporated in this 100,000-sq ft plant designed and built by the Austin Company for Duncan, situated on a 38-acre plot near the Wabash River just outside Lafayette, Ind. Of light-buff brick, the plant is trimmed with limestone, aluminum, slate and granite, is fully air conditioned and has a sound-absorbing ceiling of rubber-coated glass-fiber block in the manufacturing area. Many color schemes were chosen by employees

"Plant FRILLS proved practical". . .

. . . according to J E Bixler, president of Duncan Electric Mfg Co. This new plant has air-conditioning, sound-absorbing ceilings, an all-electric cafeteria, asphalt-tile floors, up-to-date lighting, sound-isolating machine mountings, fog-free screw machines and an odor-free plating room—all sound new plant investments. The real "frills," such as Thermopane glass, lights and walkways in parking lot, canopy over employee-entrance side, heated concrete entrance to office lobby, sunshade around the office portion, slate panels, granite entrance trim, and powder-room extras, cost less than $100 per employee, are "more than warranted from the standpoint of comfort and efficiency"

By
E J TANGERMAN
Executive Editor

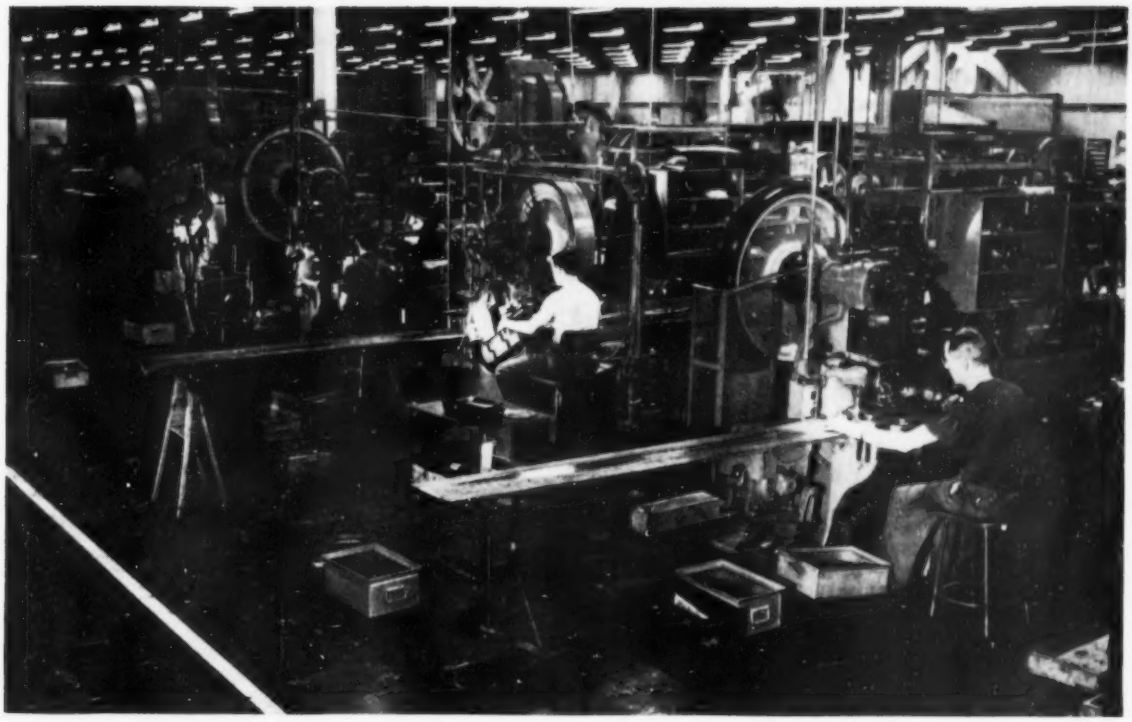
HEATING CABLES in the lobby-entrance walk prevent slips and falls in icy weather, help, with the canopy, to keep water and dirt out of the building. Three 108-ft circuits do the job. The lobby is half the length of the plant from the parking area, is approachable only on foot. Trim is granite

EMPLOYEE PARKING AREA at one side of the plant, is macadamized, and has raised concrete walks leading to this canopy to minimize carry-in of dirt, slush, and water. Windows are shaded against sun heat. These "frills" have proved very practical, according to executives, in reduced dirt and improved morale

RECESSED FLUORESCENT LIGHTING (40-watt lamps on 5-ft centers) provide 100 ft-c in the drafting area. Boards are supplemented by linoleum-topped cabinet-desks designed by the draftsmen to create an L-shaped work position for each. Walls are finished in color. The office area (rear) is similar but lighting is only 50 ft-c there. Partitions are only wainscot height, yet low sound level provides privacy for development engineers

NEW ELECTRICAL METERS and other products first take shape in this engineering model shop. Each man has his own cubicle, with small lathe, drillpress, and bench. Millers and other larger machine tools are out on the floor. Here again, high illumination is provided. Furniture was designed by the men

SCREW MACHINES were not originally to be set on tile floors, because of constant oil splash, but the foreman requested it. Sawdust is needed around the head of each machine, but the department is kept cleaner than it would be otherwise and there has been no fog



EVEN THE PRESS DEPARTMENT has tile floors, which have proved surprisingly resistant to cutting and gouging. Aisle lining is a special, 3-in.-wide, adhesive tape, and tile is set in an oilproof and waterproof adhesive. Presses are painted gray with yellow flywheels. Most operations are done on progressive dies from strip stock, so machine spacing is liberal

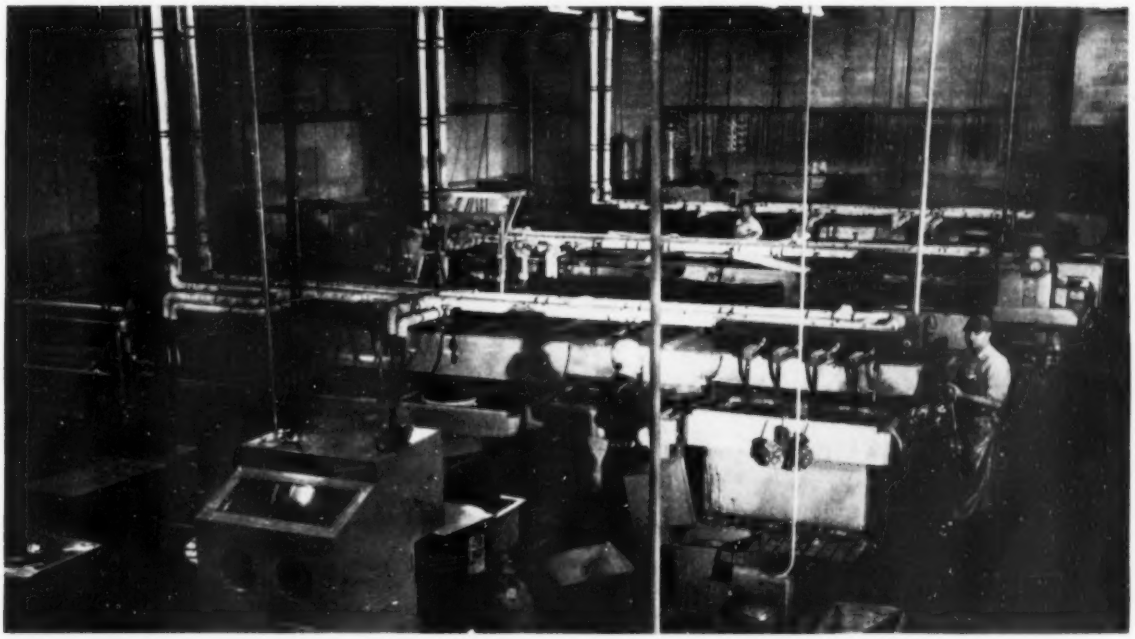
TINY METER JEWELS, set in brass posts, are automatically cleaned in the setup in the foreground. Jewels flow from a hopper into holes in an inclined wheel at center front. This carries them past a blast of wet steam to loosen and remove dirt or grease, then under superheated steam to dry. (Both come from the 30-kw steam generator in right foreground.) Jewels are blown by compressed air up duct and down to a glass-covered tray. Girls working at hooded stations can install jewels without touching them, and then check trueness of meter disks. Across second aisle can be seen three hoods extended sidewise. These open into screens on which are projected an enlargement of the wormwheel mesh or meter disk. Operator can thus adjust gear mesh, align or true disk

PRESDWOOD BENCHES and posture chairs are standard in assembly areas. A dilating operation is carried on under an exhaust hood at upper right. At left is thermal-demand meter assembly; at right, polyphase meter assembly. Infrared tunnels over conveyors handle drying. One, for drying ink on numbered cups for cyclometer registers, has five 250-watt lamps which cups pass in 30 min. To dry cement on glass meter-cover gaskets, covers are paired on a vertical endless belt that carries them up and around by hand indexing. Fourteen 250-watt lamps provide heat. Infrared permits compact installations with no heat or dirt problems

PLANT 'FRILLS' PROVED PRACTICAL ***continued***

CONTACT BLADES are soldered to coil leads by low-voltage pliers to eliminate a screw connection. A high-current transformer under the bench provides up to 50 amp for the job. Other silver soldering is done by automatic induction heat or by automatic cycle welders

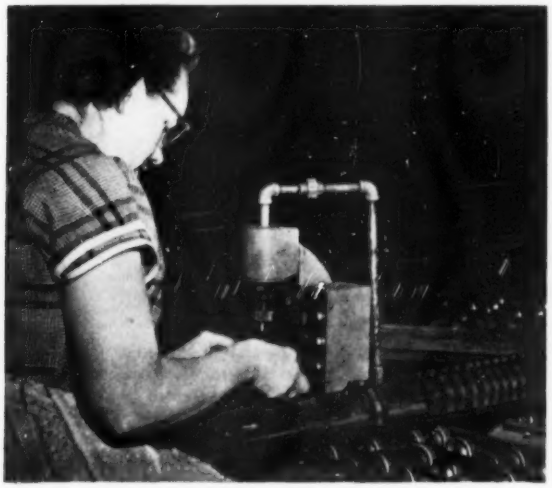
SOLDERED JOINTS in guide bearings are checked by sound. The operator places the assembly firmly against a wooden block on which is a contact microphone. She flicks the monel guide pin with her finger. If the joint is solid, the amplified sound will be a musical note; otherwise it's a dull thud

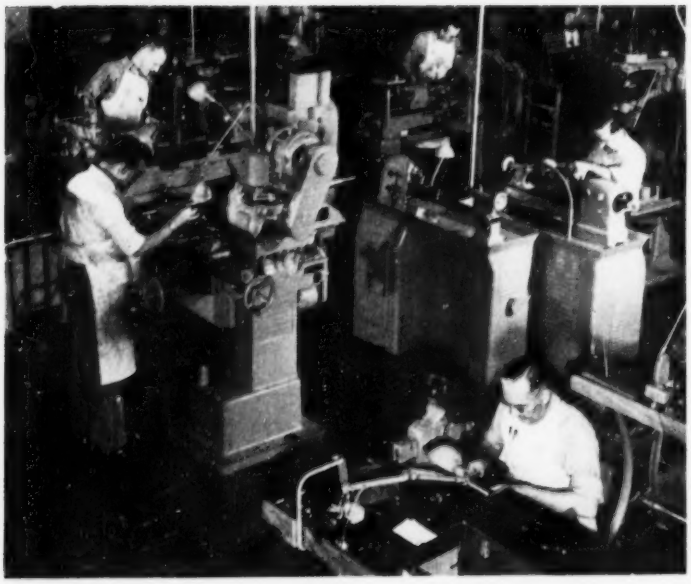


PLATING ROOM is exceptional in planning to remove fumes. Incoming air from the roof is taken down wall at far right to underfloor ducts, which carry it to fantail tubes over outer edge of tanks. Pressure is sufficient to carry air halfway across tank surface; then it is drawn the rest of the way by the exhaust system. Thus solution surface is covered by an air curtain that traps fumes; balancing air flow prevents escape to the room. Fumes exit through exhaust ducts at left in this photo. Both anodizing and plating heat are provided by 6- or 9-kw immersion heaters, permitting smaller tanks with higher production per unit of volume

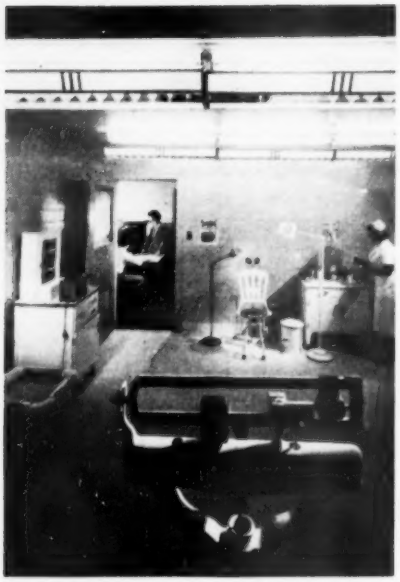
METERS ARE TESTED with stroboscopic light (vertical black box on rail by operator's head) for preliminary calibration. Meters are loaded by electronic equipment in cabinet at right. Disk is adjusted for synchronism under strobe light, then meter is run for 1-min. tests at each check point. 15 meters can be checked at once for accuracy at various loads. All test racks are vertical, hence illuminated by angle-mounted fluorescent fixtures

LAMINATIONS FOR METER COILS are counted quickly by a limit-switch fixture. The stack goes under the head. If correct (within plus or minus one lamination), the center light goes on. Too many, lights the top light; too few, the lower one



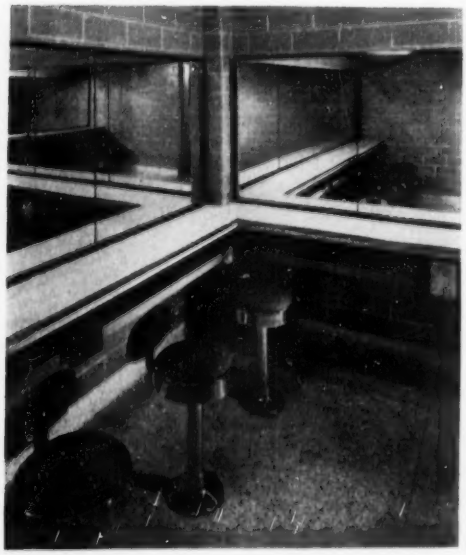


THE TOOLROOM is a compact area with an unusual machine arrangement. It is in the center of the plant, where it is readily accessible for all departments. Machines here as elsewhere are painted gray, with occasional touchup of yellow on critical moving parts

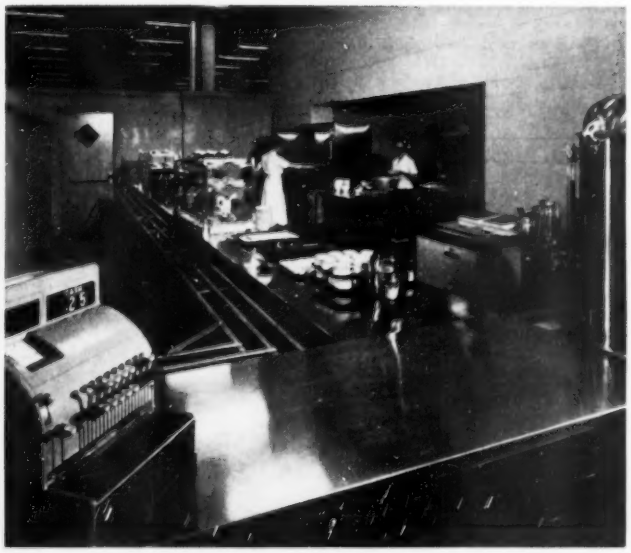


FIRST-AID ROOM has a mosaic floor and tile walls in color, with reception room mosaic-concrete floored. It is similar to most such rooms, except for increased fluorescent lighting, air conditioning, and auxiliary incandescent lights. A nurse is on duty constantly

PLANT 'FRILLS' PROVED PRACTICAL ***continued***



WOMEN EMPLOYEES have powder rooms in addition to lavatories. Walls are colored tile, floors mosaic concrete for ease in cleaning, seats are leather covered. Full-length mirrors are provided. Counter tops are cream-colored Formica, and the room is decorated in peach color. All fixtures are stainless steel, and lavatory fixtures and partitions are hung from ceiling or walls for greater cleanliness of floors. Wash basins have foot controls



CAFETERIA EQUIPMENT is stainless steel, and all kitchen fixtures are electric. Kitchen is visible from the cafeteria line (shown here), but separated from the dining area by a color-painted, head-high wall (left). Total connected load in the cafeteria is about 100 kw, but demand is 30 to 35 kw max., although equipment includes two ranges, two deep-fat fry kettles, three ovens, steam tables, and coffee urns. View from the cafeteria windows is out over the Wabash Valley

too small for a training program?

Don't kid yourself! The little company can use training just as a big one does. Here are details on the minor revolution in industrial training these last two years

BY GEORGE S ODIORNE, Management Training Staff, RUTGERS UNIVERSITY

In case you haven't heard, there's been a minor revolution in industrial training in the past two years. Price controls and tough competition put a squeeze on the manufacturer between rising costs and controlled prices, and many thousands resorted to training programs to increase the effectiveness of their work force and supervisory staff. Many small manufacturers undoubtedly heard of it, but didn't do anything about it.

"That stuff is OK for the big boys," one remarked recently, "but I'm too small to carry a training program."

Actually size has little to do with the need for training, or the benefits which can be obtained from it. In fact, those who must train most are the one-man businesses, such as the singer, prizefighter, or professional golfer. The smaller your business, and the less your capital, the greater the need for maximum efficiency from each man in it. This can't be accomplished simply by whip-cracking or order-giving; it involves an organized intelligent plan of development of your personnel.

DON'T TRAIN JUST BECAUSE IT'S FASHIONABLE

There's no denying that training programs are subject to fads. That's partly explained by the fact that it's a form of education, a field which is more theory-bound and gadget-loaded than any other. Just because some speaker at the Thursday-noon management club told of a successful program in conference leadership or labor law at his plant doesn't mean that it will apply to yours. Many a training project falls flat because it isn't really needed. The starting place for training programs isn't some other fellow's business; **it's in your own plant.**

TRAINING SHOULD SOLVE PROBLEMS

If you are looking for a good place to commence your training program, start with a problem. Is your spoilage too high? Are you getting too many customer rejects? Are you having too many grievances? Is your turnover high? Are sales falling off? Look at any one of these areas where trouble is cropping up, and ask yourself this question: **"Is this trouble because somebody should do his job better?"**

If the answer is yes, you have a training problem, and should start training the people involved immediately in order that they will be better able to do their jobs. If you are convinced that they all know their jobs, but just aren't doing them as well as they know how, **better think about training their boss!** In short, training should solve some problems; cut costs, reduce turnover, improve production, improve quality—or it isn't worthwhile.

MAKE A TRAINING PLAN

Once you've picked a problem which is aggravating, and decided upon the people who need training, jot down a training plan. Pattern it roughly like a timetable. Here is what the man knows now, and here is what he should know if he is going to do the job properly. Then list the steps by which he is to get the knowledge. Decide how much time it is going to take for each step. Let's assume the man is an apprentice electrician. You may want to have him work with a construction electrician for six months, a maintenance electrician for six months, and in the shop on motors for six months. At the same time you want him to go to vocational school nights to learn some theory. At the end of eighteen months he has moved through these three stages.

Some training programs have only four or five hours training for simple jobs, or ten years for top management positions. Training is not all class-room study or meetings, but includes understudying another man, attending outside classes, job rotation, and personal coaching. Make your timetable to do the training in the fastest and most economical fashion. You are then ready to follow through. A well-planned program aimed at real problems is the basis for good training. Except for periodic checks and evaluation over the progress of the people being trained, the hardest part is done.

WHAT CAN TRAINING DO FOR YOU?

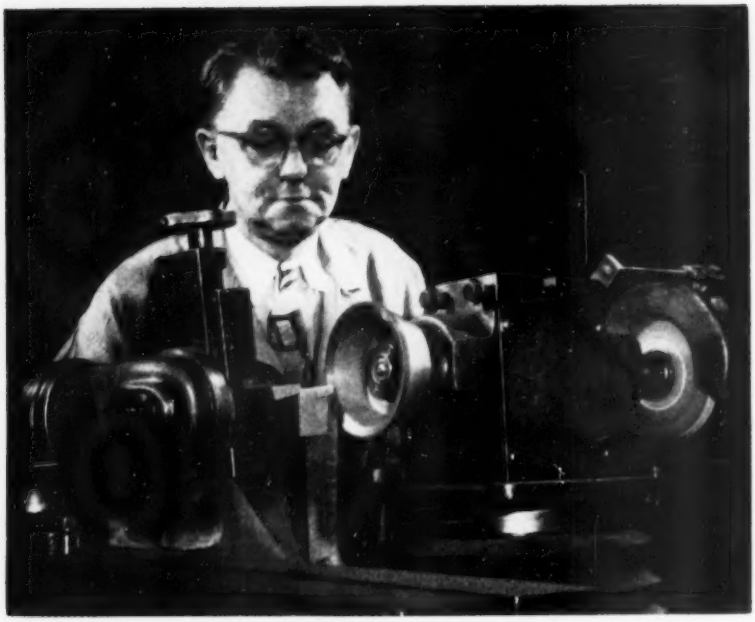
Small companies are often high-pressure outfits. Limited capital leads to pressure on costs and expenses not found in the industrial giants who can afford to have a few "feet-on-the-desk" planners to work out long-term plans. Training is a device to help the small fellow solve tomorrow's problems today. In the average small firm, survival and growth are the urgent motivating forces. Training can be an important part of your plans, for it strengthens your team, makes it more effective, increases the unity in your organization. Starting with the boss;

1. **Look for problems that involve individuals.**
2. **Make a plan in timetable form.**
3. **Follow through.**

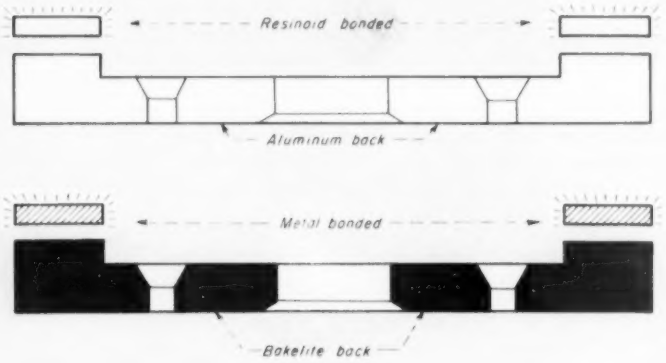
Practical carbide tool maintenance

Everybody wants diamond wheels, but right now it's a case of "Share the Wealth." Here's how you can keep your tools sharp when diamond wheels are not available

BY JOHN W RIPPLE, Sales Engineer
THE CARBORUNDUM CO.
NIAGARA FALLS, N.Y.



DIAMOND-WHEEL GRINDING OF CUTTING TOOL, using a Type D11B wheel with narrow wheel face. This wheel will cut faster and cooler than a wide-face D11W wheel



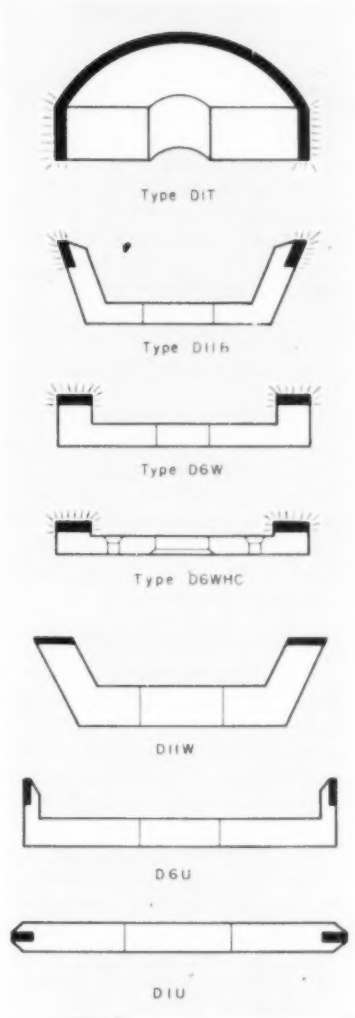
TYPES OF BONDS AND BACKINGS for diamond wheels manufactured by Carborundum Co

Both the manufacturer and the user of a carbide-grinding abrasive have a common objective: To place on a given job the best possible grinding wheel to grind carbide tools safely and economically under the conditions found in the particular shop. The phrase "grind safely" may be considered as the most important factor. It is no use to grind quickly and cheaply if the tools are full of grinding cracks. Therefore, all other considerations are of lesser importance, and before you think of costs, cutting speed, or any other factor, you should first determine that tool safety has been achieved.

You can obtain this quite readily by the use of extremely soft wheels. But, in practice, economy dictates hard wheels for longer life and lower cost. The final answer must be a compromise: Use the hardest wheels which are safe for a given shop and application.

For carbide grinding, diamond and silicon-carbide abrasives are employed. The latter is the "tonnage" abrasive and has been used for roughing and semifinishing for years. Because of the present diamond shortage, it is coming into increased prominence as a finishing abrasive, and attempts to so use it have been quite successful.

Silicon carbide is rated at 2500 Knoop and is considerably above tungsten carbide, which is rated at 1600. Diamond is rated at 8000. Because of the smaller difference in hardness between silicon carbide and tungsten carbide, the former must be more softly bonded to permit wheel breakdown, whereas diamond must be strongly bonded to obtain maximum use from each particle. Either resinoid or vitrified bond is commonly employed, but metal bond is frequently employed for diamond where maximum strength is allowable. Other bonds, such as rubber or shellac, could be employed but present experi-



TYPES OF DIAMOND WHEELS currently produced for carbide tool grinding

ence does not yet justify their use.

For rough grinding carbide tools, silicon carbide is always advised. The tools may be handled in a rough manner, such as digging into the wheel, which has two beneficial results: The carbide is removed quickly without rubbing on the wheel to create heat, and the wheel is kept open and unglazed, therefore in good cutting condition.

For many applications, silicon carbide is a fully acceptable finishing abrasive. For example, on single-point tools which are to be used for roughing cuts, the sharp edge generated by a diamond wheel would be useless and, in fact, is frequently honed off before use. For such grinding, therefore, diamond wheels are unnecessary, at least from the standpoint of the wheel maker. The fact that they are widely used in finishing lathe and planer tools is the result of local conditions in individual plants.

Years ago, most single-point tools were ground with silicon carbide only. But it was soon discovered that, for aluminum, brass, and similar materials, a keen edge was required, and that it was easier to obtain this with a diamond wheel. Less skill is required, grinding time is shorter, and the appearance is better. Moreover, it is easier to hold to close dimensions. As a result, the application of diamond wheels increased until virtually all single-point tools are now diamond ground. However, diamond wheels are becoming increasingly scarce and it may be necessary to revert to silicon carbide for finishing many single-point tools to conserve diamonds for more essential work.

SILICON CARBIDE SERVES

Even in the field of cutters, silicon carbide may be used. There has been considerable success with resinoid-bonded silicon carbide for both roughing and finishing. This is particularly true for rough cutters where a runout of one or two thousandths is permissible. It is less true for finer tools, such as reamers, counterbores, and others having close tolerances and requiring extremely sharp edges.

The matter of replacing diamond wheels with silicon carbide is of considerable interest to most carbide tool users. The diamond wheel situation has become highly critical and there have been numerous cases of hardship in which production has been held up for lack of sharpened tools and cutters. The problem of finding an acceptable substitute has, therefore, received considerable attention, and it appears that a solution, or at least a partial solution, has been found. It is not claimed that substitute wheels are fully equal to diamond wheels, but rather that such wheels are available and will do the job. They require more grinding time, greater care in use, and greater skill to produce tools and cutters equal in quality to those obtained from diamond wheels. Nevertheless virtually any job can be kept going without diamond wheels.

For offhand grinding and for some fixed-feed grinding, such as surface grinding, vitrified silicon-carbide wheels are doing the job. For other fixed-feed grinding, as on cutters, a resinoid bond is the answer. Thus, it is possible not only to provide acceptable tools and cutters for the shop, but also to obtain freedom from dependence on a scarce material.

HOW TO GO ABOUT IT

In consultation with your abrasive supplier and the men in your plant responsible for the use of abrasives, ask for recommendations on silicon-carbide wheels, both vitrified and resinoid, which will be suitable to replace the diamond wheels now in use. Use these wheels with an open mind. You may find some opposition to even trying them, but necessity requires that you do try them. Where you find these wheels usable — not necessarily equal to diamond wheels—just "usable," obtain a small reserve supply. They may enable you to avoid a bottleneck at some time when you are out of diamond wheels and the next delivery is promised for six months in the future.

This is not an attempt to paint a gloomy picture, or to predict an even tighter diamond situation. Rather, it is a practical precaution to avoid toolroom shutdowns that might have been avoided. For the fact remains that diamond wheel orders have extended delivery promises, and it is quite likely that you may be out of them for some jobs long before a replacement can arrive. Where diamond wheels must be used, it is necessary for the good of the metalworking industry that they be stretched out as much as possible.

The most obvious way of doing this is by use of lower concentrations. In many cases, where 100 concentration is now employed, it would be possible to use 50 concentration, and scores of shops have been doing this for years. It will mean lighter feeds and speeds,

hence grinding time will be lengthened, but completely satisfactory results can be obtained and the supply of available diamonds will be thereby stretched. Wet grinding is not merely recommended—it is mandatory under NPA Order M-103. At the point of contact between wheel and work, extremely high temperatures are reached, enough to produce incandescence of the material being ground—in other words, sparking. The number of Btu's is minute at any one instant and most of them are dissipated in the air or through the wheel or work. But there is a cumulative effect which raises the temperature of the diamond wheel at the cutting face to a point which causes charring of the resinoid bond. A charred bond has little strength and loses its diamonds readily.

CHARRING WASTES DIAMONDS

In wheels with a light-colored bond, this charring is readily apparent. In some cases it is extensive enough to cause socalled heat cracks across the wheel face and, in bad cases, these may extend down into the backing material. It is a major cause of diamond wastage, but may be controlled by lighter feeds, by not pushing the wheel beyond its ability to cut and, principally, by adoption of wet grinding for better heat dissipation. The best method of wet grinding is with a pump and stream of coolant, but even a drip system is a distinct help.

Another conservation step is to use the narrowest wheel faces possible in machine grinding. For example, in surface grinding, a 7×¼×1¼-in. wheel will cut faster and cooler than a wheel twice as thick. A type D11B flaring cup wheel will be faster and cooler than a D11W. A full line of wheel shapes has been developed, based on this principle of narrow contact area, and it is recommended that you investigate their use. One of their principal advantages is that they make possible the use of the newer, harder bonds which wheel manufacturers offer. Such bonds have been tried and often rejected for conventional wheels because they are too slow and hot cutting. With narrow areas they become usable and offer appreciably longer life, hence lower costs.

DON'T OVERDRESS

Excessive dressing is another cause of diamond waste. Tests have shown that there is more wheel loss in a 10-sec dressing than in 30 min of grinding. Therefore, it is to your advantage to dress as little as possible. There is no set rule to apply; the idea is to dress only when the cutting rate becomes exceedingly low, then to dress lightly. All that is necessary is to remove the carbide and debris loaded into the wheel face. It is not necessary to clean up the wheel and restore a new appearance. Leave the wheel dirty and a little glazed—it's cheaper.

One of the most effective diamond conservation practices is to issue each man his own wheel which he removes from the machine at the end of his shift. This fosters a pride of ownership and a sense of responsibility, and there are cases on record where it has reduced wheel costs 75%.

In maintaining carbide tools, remember that whenever there is heavy stock removal, or when mixed metal—steel and carbide—is to be ground, use silicon carbide. Stock will be removed more rapidly and economically. Reserve diamond wheels for final finishing, the touch up, on carbide only. Because of their deep penetration into steel, diamonds will be pulled from the wheel by the tough steel, resulting in shorter life. Where a flat, uniform surface of steel and carbide must be produced, use the diamond wheel for the last few passes only.

There is considerable difference of opinion as to wet or dry grinding with silicon carbide. Wet grinding with a flood of water, properly directed, does protect the work and is advisable. But the operation is messy and operators tend to reduce the coolant flow to a token stream. This leads to alternate heating and quenching of the tool, and is a primary cause of cracking. This is usually the basis for the preference for dry grinding. The choice depends upon conditions within a particular shop. Wheel manufacturers can furnish wheels for either wet or dry cutting but cannot establish the conditions.

In grinding wet with silicon-carbide wheels a common coolant is tap water piped directly to the machine. Objections to this are the rusting of the machine and work, and the low temperature of the water in Fall, Winter, and Spring. These have led to an increasing use of soluble oil and water mixes with a circulating pump and settling tanks, which seems to be a satisfactory system.

DIAMOND WHEEL COOLANTS

For diamond wheels, soluble oil is not so satisfactory. Wheels break down slowly, so oil and carbide powder tend to produce a gummy mud which loads into the wheel face and reduces the cutting rate. Occasionally, this may become so heavy that you can scrape it off with a fingernail. This condition becomes worse with thick coolant mixtures but is less of a problem with thin mixes, such as 80 to 1. Kerosene is a reasonably good coolant for drip systems, as it tends to keep the wheel clean and has a satisfactory heat transfer rate. It is, however, unsuitable for circulating pump systems, and some operators report skin and sinus troubles.

There are at least three, and possibly more, coolants containing detergents which are satisfactory in that they remove heat, keep the wheel clean, and have no known health hazards. A composition of this type seems to be about what is wanted for carbide grinding.

Grinding is not a mysterious process. It follows certain patterns and rules that are fairly well known. If grinding is done frequently and properly, carbide tools will be maintained in first-class condition, maintenance costs will be lower, and the end product will be of good quality.

Is coolant for carbides really necessary?

Here's some more on the running fight between the pros and cons of coolants for high-speed turning. The job is bearing races, which were first speeded up by installing a special clamp toolholder (*AM* Mar 2 '53, p 108). Now the author reports another jump in production and indicates that the elimination of coolant was a contributing factor

BY LEO J ST CLAIR, President, ST CLAIR TOOL CO

One of the toughest machining jobs I ever worked on is turning railroad bearing races on a 36-in. Bullard at TCM Mfg Co, Harrison, N J. Stock is SAE 4320, and production was originally 5 units per hr. This was upped to 7 per hr when we first applied clamped carbide tools of special design, utilizing the advantages of mechanical clamping instead of brazed joints.

For some months we encountered tip breakage—as much as three tips per day. Actually, this was not an important cost factor because the broken clamped bit could be indexed around to present another edge to the work, taking about a minute per change.

Still, this breakage was annoying, particularly because the toolholder design prevented bending of the tip, and I maintain that it is next to impossible to break a carbide tip unless it is bent.

The job had been run with a soluble-oil coolant ever since it started—about two years ago. Up to a short time ago, I never questioned the use of coolant. But because of the breakage, I theorized that the coolant might be responsible for a major portion of this trouble; particularly because the cut was uneven and the tip was red hot. This meant the tip was being doused with coolant intermittently and was being subjected to thermal shock. This in turn undoubtedly developed minute cracks that turned into larger breaks, and was probably the source of our difficulty.

The moment dry cutting was adopted, carbide breakage dropped to zero except for isolated cases where the operator let the tips get too dull before indexing a new edge into position. Dry cutting evidently eliminated thermal shock, because the tip ran hot all the time. This did no harm as long as the tip was sharp. Moreover, dry cutting reduced the power drain about 15%.

Tables on power consumption when removing a cu in. of alloy steel per hp per min show that we should drain about 1.25 hp—at least that's the figure for conventional turning. Actual figures, though, are these (cutting wet):

1. 18 lb of metal removed in 2 min, 10 sec.
2. Roughing tool takes away 90% of all metal cut.
3. No-load meter reading is 25 amp.
4. Turning-tool load was 55 amp with sharp tool, 75 when dull.
5. Net power input was therefore 30 amp, equal to 9 hp. Figuring the metal removal per min from this data, we have 0.3 hp per cu in. of metal removed per min!

An explanation of this small power drain must involve point-annealing of the material being machined at the tool tip. Rupture temperature must be higher than the anneal point.

When dry cutting, the power reading dropped to 50 amp, 5 amp and 15% (net) under the load when wet cutting. This clearly indicated that coolant had been interfering with cutting action.

In six months, production rose from 7 units per hr to 13, partly due to dry cutting, and partly to harder carbides and upward adjustments in speed and feed allowed by the toolholder design.

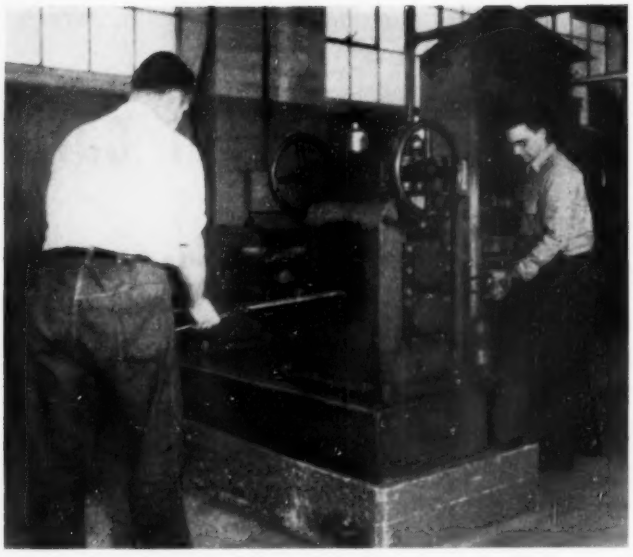
We expect further increases in production. For example, we have tried a feed of 0.043 ipr instead of the standard 0.023. Good results were obtained.

At 200 rpm and with a feed of 0.043 ipr, the side head moves at 9.6 ipm and cutting time is only 1 min, 10 sec. Metal removal is at the rate of 15 lb per min with a single tool—and this is an outstanding rate of metal cutting. Turning at this speed draws 75 amp, but the hp per cu in. of metal removed per min figures out to 0.25—indicating good point annealing even at the heavy feed.

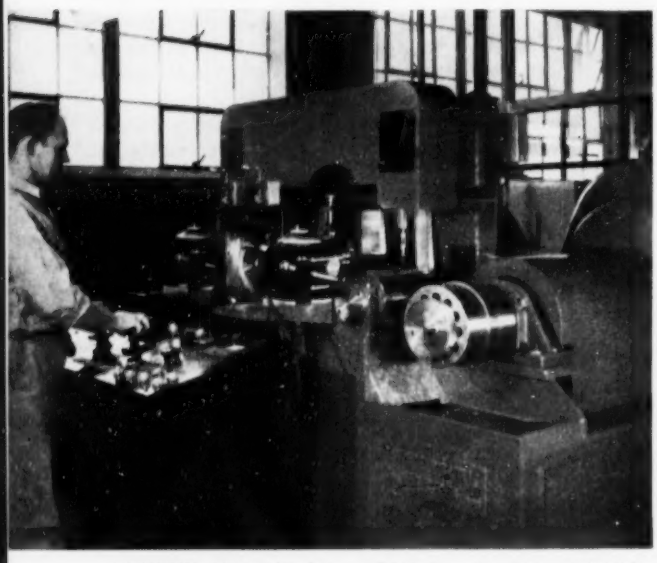
Even higher speeds may be possible—up to 400 rpm or 800 rpm, 1000 to 2000 sfpm—with a further decrease in power consumption. This will require a new machine-tool design that will attain the spindle speed and provide adequate power. The top limit beyond which we cannot go is where the temperature at the tool tip will soften the carbide excessively.

We're not to that limit yet, although the present temperature, I would judge, is about 1600F. The section of the tip around the chip appears light orange in color; at night with the lights off it provides a glow that illuminates a substantial area.

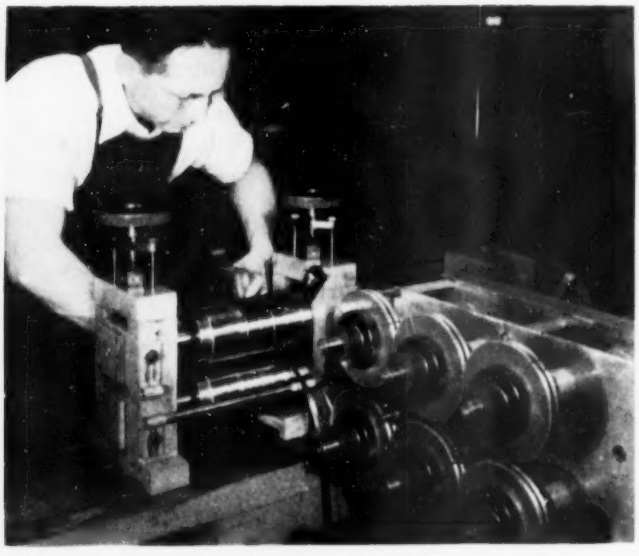
HIGH-FREQUENCY INDUCTION FURNACE melts special alloy which is poured into ingots weighing 2 to 25 lb. Alloying elements are controlled to 0.01% to achieve temperature-compensating characteristics of Elinvar-Extra for hairsprings. Operation is performed under laboratory conditions



HOT ROLLING PRODUCES STRIP of standard commercial tolerance after ingot has been forged on full-size hammer. This is mainspring material; hairspring alloy is forged into rod, turned to remove forging scale, then swaged



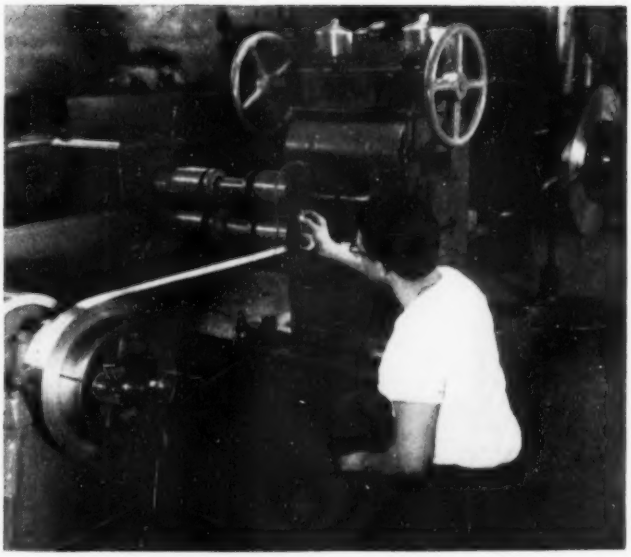
SENDZIMIR MILL rolls strip to 0.002 in. thick with ±0.0001-in. tolerance, will roll to 0.001 in. if required. Special rolls had to be obtained for this because of the extreme hardness of the alloy



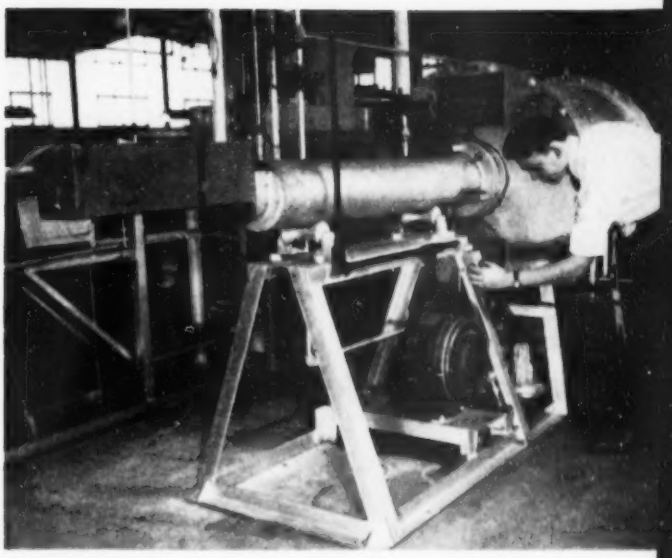
SPECIALLY BUILT SLITTING MACHINE cuts 0.002-in. Dynavar strip into strips 0.050 in wide within a tolerance of ±0.001 in. Stock then passes to winding dep't where it is wound into mainsprings

VEST POCKET STEEL MILL

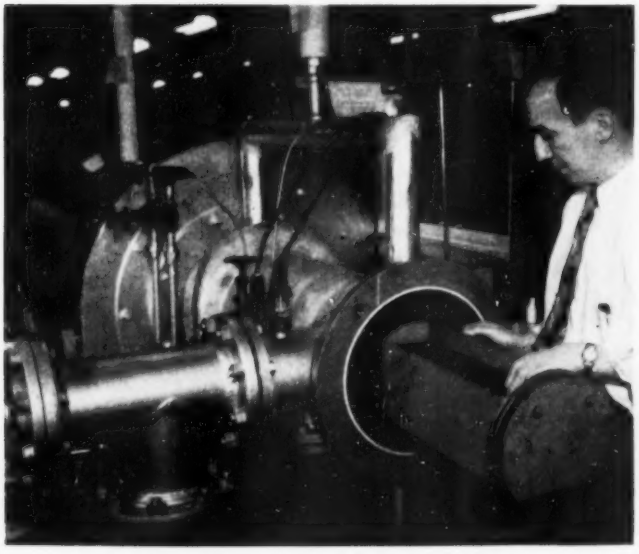
By H E LINSLEY, ASSOCIATE EDITOR



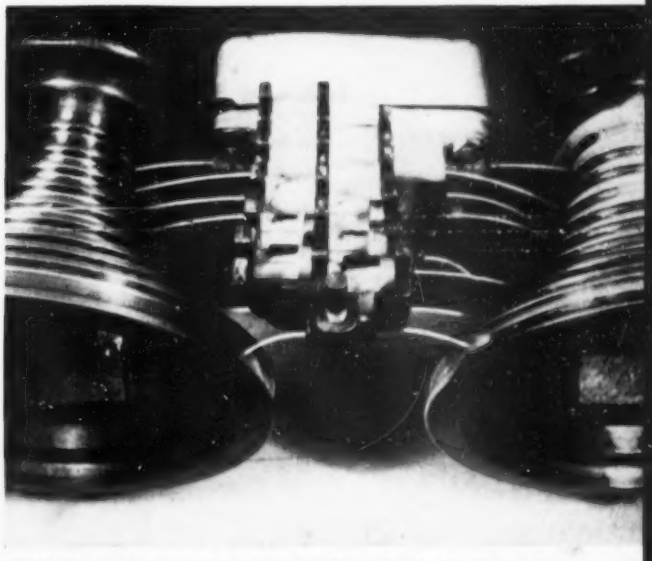
COLD-ROLLING MILL processes strip to further reduce thickness and improve physical properties. Rod stock is swedged for same reason. Commercial mills cannot handle material on such a small scale, so Hamilton had to set up its own equipment. Processing metals for other instrument manufacturers helps keep facilities engaged



STRIP ANNEALING is performed in a controlled-atmosphere gas furnace. Then material is passed through a continuous strip polisher to remove all surface defects and any traces of oxide. Abrasive belts of 50X grit are used for roughing; 80X and 100X for polishing



VACUUM FURNACE is employed for heat-treating springs to obtain the proper physical properties without slightest oxidation. Same equipment is also used for small quantities of precision-made stainless steel parts on subcontract basis



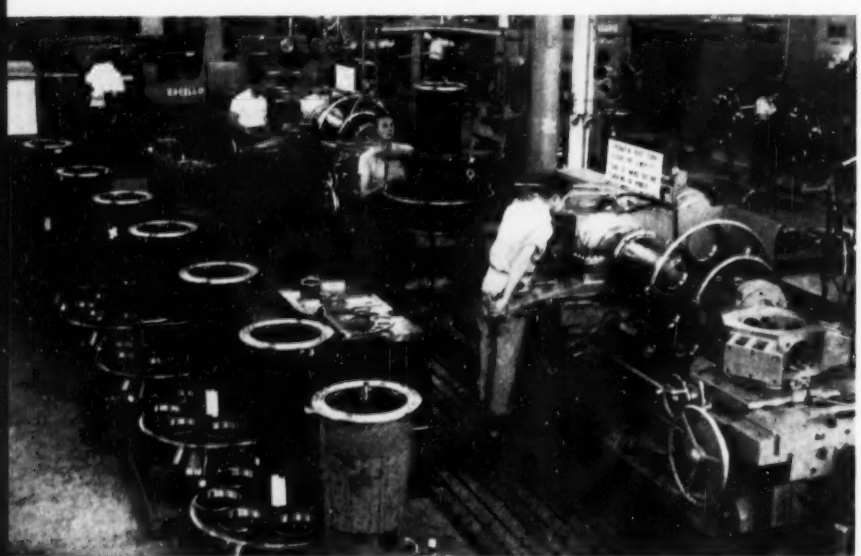
WIRE DRAWING by multiple passes makes possible 12 reductions in wire diameter in one drawing operation. Tolerances as close as 0.0005-in. are obtainable, using precision-polished diamond dies made in Hamilton's crystal tool section

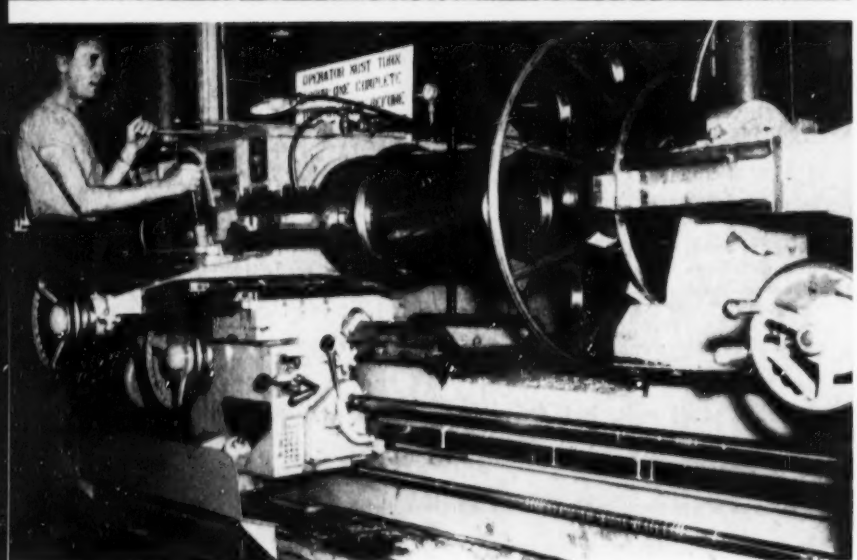
The equipment duplicates that of a regular steel mill, but on a small scale. Its products, however, fits easily into a vest pocket. It's used by Hamilton Watch to make hair- and mainsprings of special alloys from raw material to finished springs.

Special

AFT FRAMES FOR J-47 JET ENGINES are built up on taper-rolled stainless barrels, here being seam-welded together on Taylor-Winfield machines. Frame is backbone of hot end of engine, and carries combustion chambers, transition liners, turbine and compressor casings, and two main bearings for compressor shaft

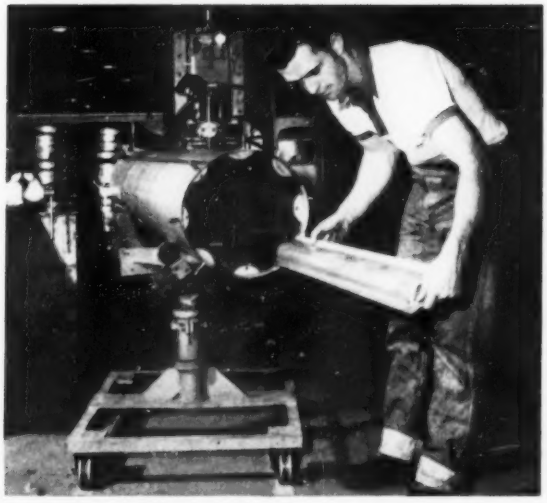
Combustion chambers and turbines have taken the limelight because of the spectacular heats and critical materials problems involved; yet other engine parts are critical, too, and require high precision as well. For instance, Ryan Aeronautical Co at San Diego, Calif, makes aft frames and cones for General Electric J-47's, using a number of special rigs and unusual processes. One is a 20-ton, $65,000 Excello boring machine designed specially for cutting frame diameters and faces. Another (not illustrated) is a shop-built machine with radial-drill arms that cuts eight holes in burner plates with four sets of roughing and finishing cutters. An interesting side process is the manner of cleaning chips from frames after machining: Each frame is clamped to a base that is vibrated by two pneumatic cylinders to shake out the chips. For other processing features, see accompanying illustrations.



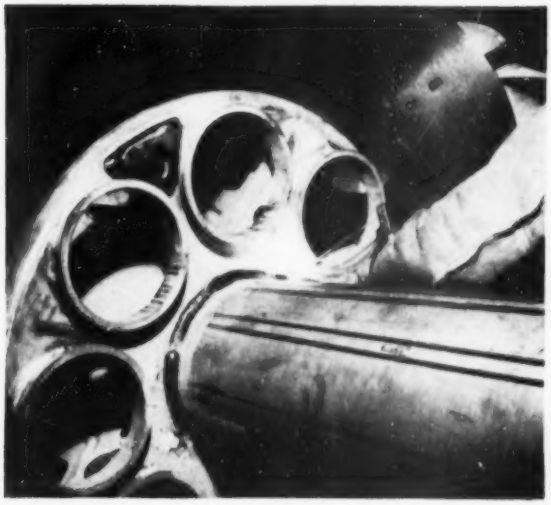


FLANGES ARE MACHINED (left, center and bottom) to finish of 63 mu in. rms on special Warner & Swasey gap lathes that have frame-swinging tailstocks in front of, and offset from, the turret. Side carriage cuts front end, while tooling on turret machines larger rings

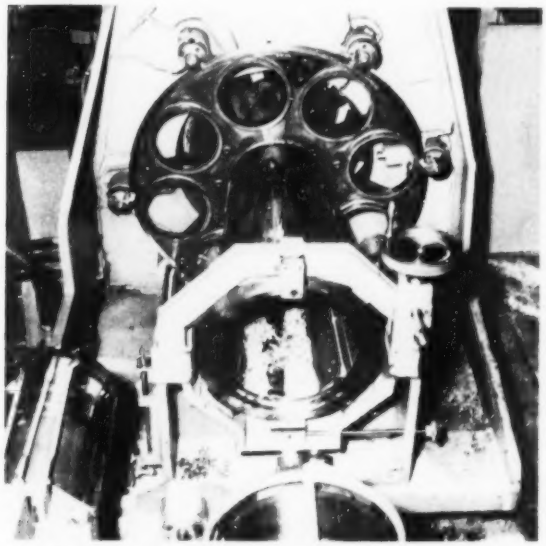
machines fabricate jet-engine frames

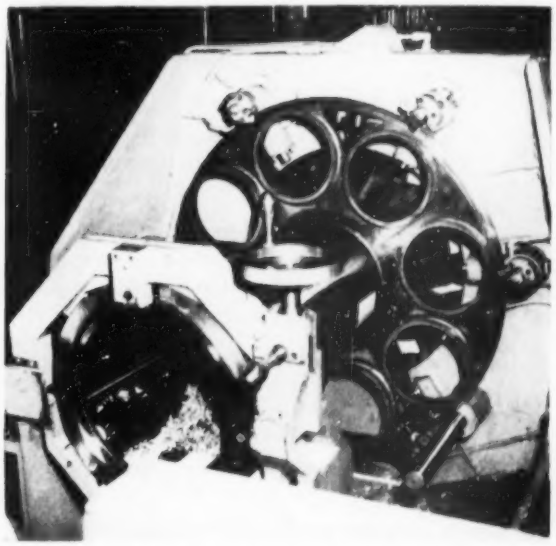


DRAWN STAINLESS STRIPS, formed in press, are seam-welded into frame barrels to provide double-wall monocoque construction for strength and rigidity

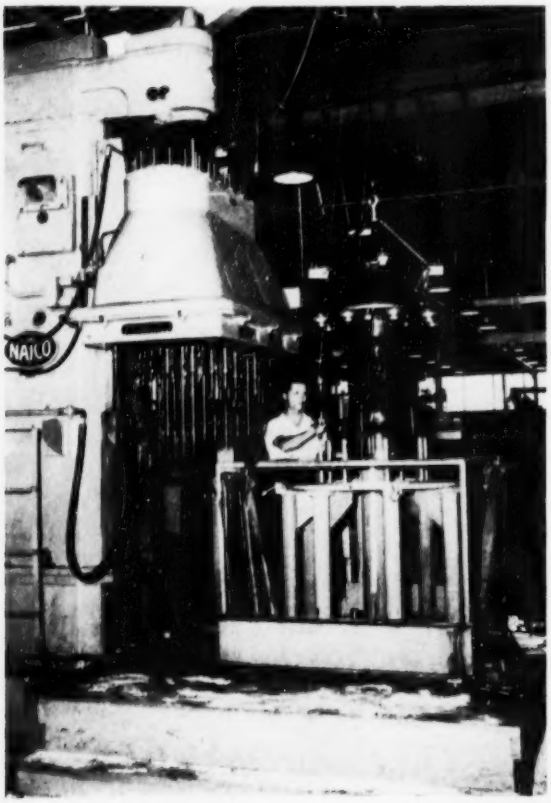


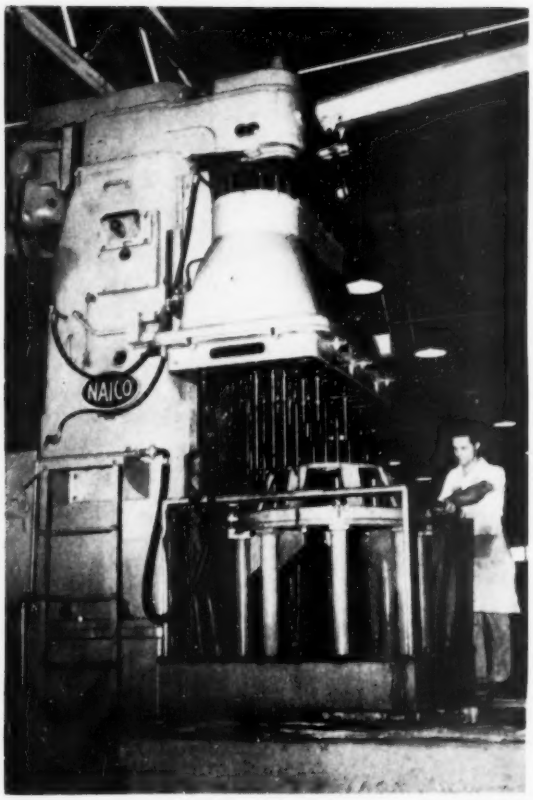
BURNER PLATE with welded-in flanges that carry combustion chambers is hand-welded to smaller end of frame barrel. Plates are blanked on 600-ton Warco press. Full frame assembly has 150 ft of welds



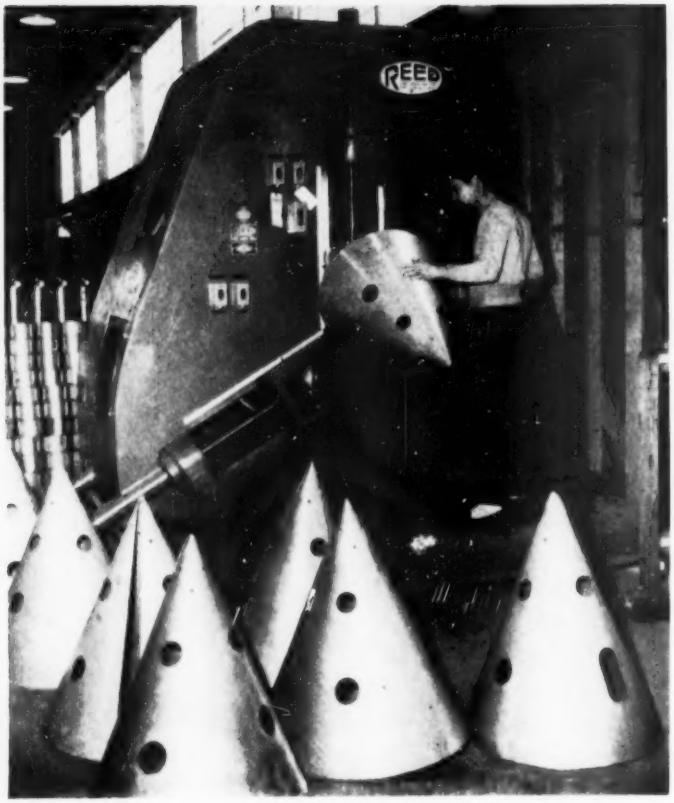


REMAINING FLANGE DIAMETERS AND FACES are cut on Excello boring machine built for this job. Three heads work through automatic cycle to cut three diameters in 15 min—former time was 4 hr. Concentricity is held within 0.002 in. by carbide tipped tools

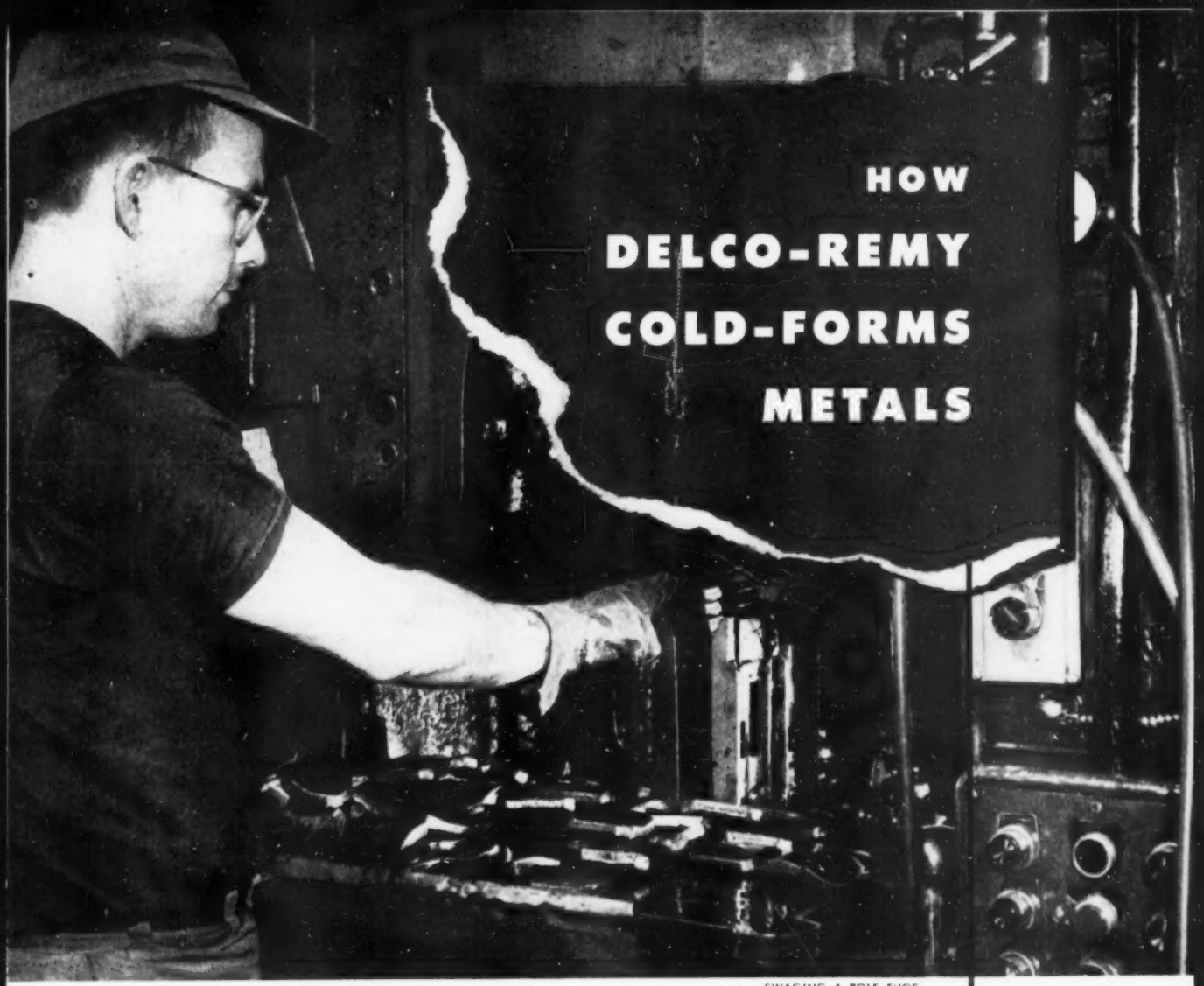




ASSEMBLY HOLES IN BURNER PLATE and heavy end flange (above, left and right) are drilled by 40-spindle Natco that cycles four times to cut 160 holes in each assembly. Work is loaded vertically into fixture, next jig plate is dropped on top and clamped, then fixture is moved under drillhead on rails. Three-hour drilling job takes only 15 min with this machine



INNER EXHAUST CONES are made on Reed roller by inserting pattern-cut stainless sheet. Operation replaces rolling of truncated shape, then welding on press-drawn tip. Cone is seam-welded to complete fabrication



HOW DELCO-REMY COLD-FORMS METALS

SWAGING A POLE SHOE

BY ROBERT L KESSLER, Master Mechanic, W A FLETCHER, Chief Process Engineer,
W P BOWMAN, Process Engineer, DELCO-REMY DIVISION, GENERAL MOTORS CORPORATION

In a typical manufacturing setup for automobile parts, about 45% of the cost of a finished product is material, 35% is overhead and 20% is direct labor. Thus, to reduce the cost of a product, one of the best starting points is to seek ways to conserve material.

Waste of raw material in the form of chips may reach 70% on some types of "regular" production machinery. But with cold-forming equipment — presses and headers — the waste may be virtually nothing or only a few per cent. Material savings of 50% or more are common, according to our experience.

Another advantage of cold-forming processes is the fact that only standard machines are required. The costs of tooling up are therefore not expensive compared to special-purpose machines, and delays in starting parts manufacture are avoided.

High production rates are realized by the four cold-forming processes: sizing, flat and rotary swaging, coining, and extrusion — plain as through a die, and impact, as back over a punch. Good tool life is obtained.

The problem of how to make a part by cold forming is usually more difficult than to determine the value of doing so. But the savings should always be large enough to permit paying for the equipment in one or two years. Often, the amortization period is a few months.

American Machinist SPECIAL REPORT NO. 340 TO THE METALWORKING INDUSTRIES

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Flat swaging produces a better pole shoe

METHODS THAT DID NOT WORK

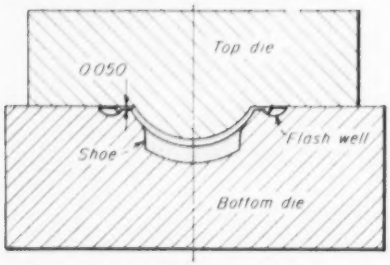


FIG. 2 .. **METAL FROZE** in the wings, trapped material at center

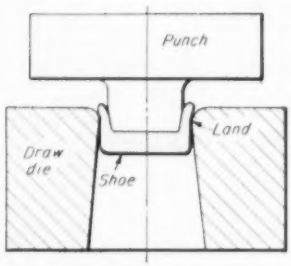
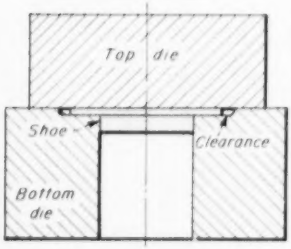


FIG 3 .. **DRAWING** in one step required too much reduction. Wings tore



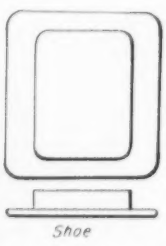


FIG. 4 .. **FLAT SWAGING**, cold, worked, but the wings had to be bent

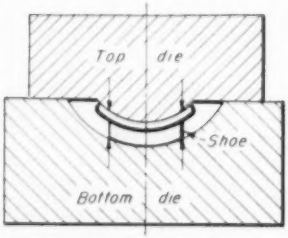


FIG. 5 .. **BENDING** the flat-swaged body caused depressions at arrows

METHODS THAT WERE SUCCESSFUL

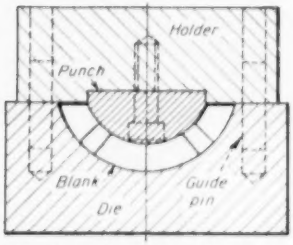
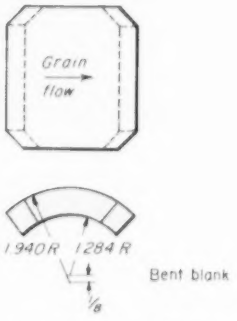


FIG. 6 .. **BLANK** is bent before swaging. Note different radii



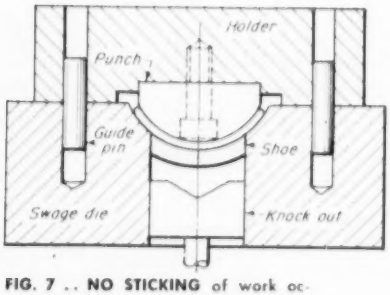


FIG. 7 .. **NO STICKING** of work occurs with straight walls in die cavity

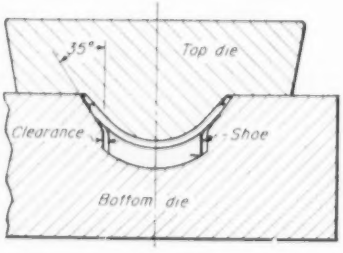


FIG. 8 .. **SIZING DIE** sets wings at desired thickness and position

By changing the manufacturing method for generator pole shoes, Delco-Remy realized these advantages: (1) increased electrical efficiency of generator, (2) reduced amount of copper necessary in field coils, (3) greater freedom from rejects, as from grounding of coils forced over sharp corners, and (4) use of flat bar stock instead of a special rolled section. The savings in copper alone paid for the equipment.

Pole pieces were originally made from a special rolled section purchased in long bars, cut to length, and coined to thickness. Current processing involves six operations:

1. The 2½-in.-long blank with 45° corners is cut off from 0.545 x 3-in. SAE 1008 hot-rolled steel. With grain flow parallel to the 2½-in. dimension, splitting is practically eliminated.

2. The blank is bent to the correct radius of the pole piece. By bending at this stage, likelihood of jamming the part in the swaging die is avoided.

3. Pierce and countersink one side of the screw hole in a 2-stage die. Because of the metal thickness, the punches must have slight back draft.

4. Swage the wings surrounding the body of the piece. The piece is located by a pilot that countersinks the other side of the pierced hole.

5. Coin the thick middle section to a thickness tolerance of ± 0.002 in.

6. Drill and tap the pierced hole.

Production rate from the line averages 2000 pcs per hr.

DEVELOPMENT WORK

The technique involved in making the cold-formed pole shoe was established only after consideration of various methods and making numerous experimental setups. This work is of interest because it illustrates the methods that would be attempted by experienced methods engineers. The results obtained may help to indicate to others in industry if somewhat comparable

cold-forming jobs can be performed successfully.

Hot Forging. First method attempted was hot forging a 1⅜ x 2½-in. slug of low-carbon steel heated to 1800-2100 F. The slug contained the right amount of material and should have filled the die space when struck in either a 100-ton mechanical or 400-ton hydraulic press. Actually, in both cases, the metal moved just so far in the wings, then froze and trapped the metal in the center. Hence, the shoe was too thick in the center. Forging temperature made no noticeable difference in results. Erosion of the die is high because the die cannot be lubricated.

Drawing Method. In this process, a slug of hot-rolled steel was drawn cold through a rectangular die with a rectangular punch, forming the wings in the process. Sizing would follow. But in the drawing operation the reduction in thickness was so great that the wings were pulled from the main body of the shoe. Possibly the drawing method could be used if the reduction is accomplished in two or more stages with intermediate annealing, but the expense is too great.

Cold Swaging. In an experimental setup, the pole piece was easily made by the flat-swaging process, but later, in bending the body to the desired curvature, depressions were produced at the junction of the wings and body by concentrated pressures. Success was in sight. It was decided to place a flat slug of hot-rolled steel between two dies with the pole-shoe radii on them, and to swage and bend the shoe at the same time. Actually, it was found necessary to bend the blank first and swage in a subsequent operation, as stated earlier, because the blank tended to wedge in the combination bending and swaging dies. Sticking was because the metal flowed outward in the body of the shoe, locking it in the die. With a pre-bent blank, however, the metal flowed only in the downward direction and did not lock in the die.

Two further "kinks" were discovered during the experimental work: First, the cavity in the swaging die for the body of the shoe must have perfectly straight walls. Any draft caused locking and ejection was impossible. Second, a slight dip was placed in the end of the body, so that metal would flow uniformly into the wing sections and fill them completely. Finally, the dip was eliminated by reducing the corner radius on the body.

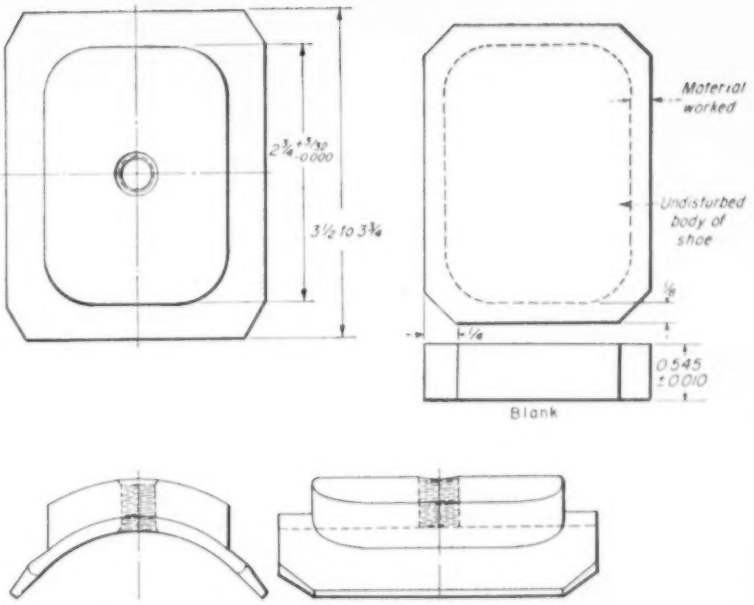


FIG. 1 .. **SWAGING OCCURS** at the edges of the pole-shoe blank, outside of the dotted line. Reduction in thickness is 72%. SAE 1008 hot-rolled steel is used

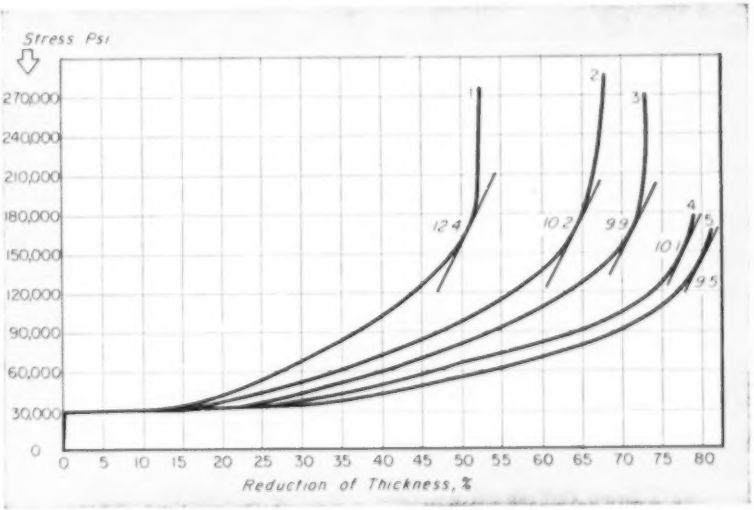


FIG 9 .. **MAXIMUM PRACTICAL RATIO** of width to thickness for cold swaging is 10:1, as shown by tangent lines to curves 1 to 5. Additional pressure has little effect

PRESSURE CALCULATIONS

When the shoe is swaged, the only metal that actually flows is in the rim. To find the pressure required to swage the piece, it was necessary to calculate the area of the swaged portion and the percent reduction in thickness. Area worked at the start equalled 2 sq in., and that at the end equalled 6.75 sq in. Yield point of the steel is 30,000 psi. Hence, force to start

metal flow is 2 x 30,000 = 60,000 lb or 30 tons. Reduction for a 5/32 in. thick wing equals 0.555 (original thickness) −0.156 = 0.399 in. Percent reduction = 0.399 ÷ 0.555 = 72%. From curve 5, Fig 9, it is seen that the pressure required at the end of swaging is 96,000 psi. On the basis of a final area of 6.75 sq in., the total force needed is 325 tons. Because of stock variations in respect to hardness and yield point, plus need for a safety factor, one would use a 400-ton press.

Now suppose we had wanted to make the wing ⅛ in. thick. The reduction would have been 77.5% and the pressure 123,000 psi. The shoe stock has an ultimate strength of 110,000 psi. Hence, in almost every case, we could expect the shoe to split in swaging.

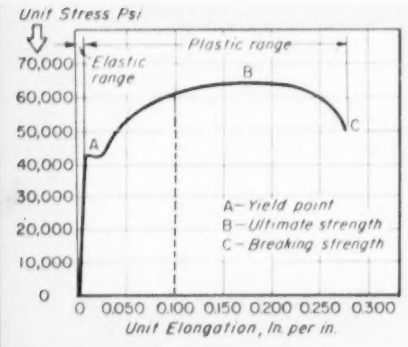


FIG. 10 .. TO CAUSE plastic flow, the metal must be stressed past point *A*

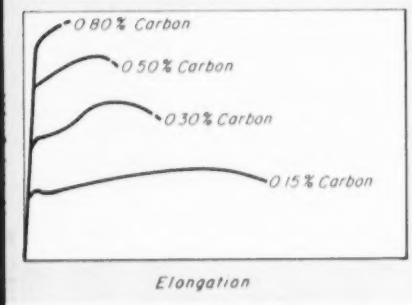


FIG. 11 .. CARBON CONTENT of the steel has a marked effect on working pressure

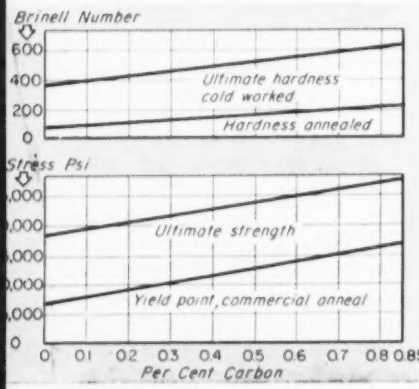


FIG 12 .. YIELD POINTS of commercially annealed steels vary with carbon content

THEORY OF COLD WORKING

Pressure calculations as above were made after a study of the theory of cold working of metals. When pressure is applied to metal, it must deform a slight amount in order to exert a counteracting force. Deformation occurs at the weakest, or "slip", planes. After all of the slip-plane movement has been used by cold working, any additional pressure causes rupture of the metal.

Study of the stress-strain diagram of a metal helps to understand cold-working theory. In the elastic range between zero pressure and point *A*, Fig 10, the metal deforms uniformly with increasing pressure, according to Hooke's law. But at point *A* a great increase in strain (deformation) occurs for only a slight increase in pressure, or stress. This is the yield point. Metal that has been stressed past this point will retain the shape it had at time of pressure release. Between points *A* and *C* the metal is in the plastic range, but takes progressively more pressure to keep it moving. For example, if a piece of steel is cold worked until its length increases 0.100 in., the pressure required will be 61,300 psi, or well within the plastic range. If the process is interrupted, and it is again desired to cold form the metal, a new yield point of 61,300 psi must be surpassed before the metal will again flow.

The plastic range of a metal, say steel, can be changed markedly by varying just one of the constituents. Fig. 11 shows stress-strain curves for four steels with different carbon percentages. It will be seen that carbon content has a great effect on plastic flow.

Iron, or steel, flows much more readily in tension, as in drawing, than it does under compression, as in swaging. In other words, the material is much more ductile than malleable.

The phenomenon of strain hardening, that is, acquiring a higher yield point and becoming stronger under cold working, is valuable when extruding the shank of a bolt on a header. The piece will be stronger than a screw-machine product. On the other hand, this property may limit the amount of cold working that can be done on a product without annealing. This heat-treating operation allows the grains of the metal to move about and realign themselves with the original lattices and regain the original yield point.

Theoretically, the yield point should be the same in compression and tension, but the changing area of the metal and tool friction in compression make the yield points slightly different. In any compressive cold-working operation, more pressure will be required to move the last bit of metal than the first.

The lower the percentage of carbon, the better the plasticity in cold working, Fig 11. Yield points for commercially annealed steels, with their ultimate strength, are given in Fig 12. It will be seen that both the yield point and the ultimate strength increase directly with percentage of carbon. And when steel is cold worked, its strength and hardness increase, Fig 9.

SPRINGBACK

The actual springback in steel is a very small percentage of the variation in size resulting from a cold-working operation. Take the pole shoe. The original stock was 0.545 ± 0.010 in. It is to be coined to a finished dimension of 0.530 ± 0.002 in. Hook's formula is $D = S \div E$, where D is the deformation in in. per in.; S is the stress, psi, and E is the modulus of elasticity (30,000,000 for steel).

By using the stress-strain formula, one can find the amount of springback when blanks of maximum and minimum thickness are cold-coined to 0.538 in. The reductions are: for minimum-thickness blank, 0.935%; for maximum-thickness blank, 4.5%.

For the 0.935% reduction, ref-

erence to Fig 9 shows that it is just past the yield point, and so we can use $S = 30{,}000$ psi. But for 4.5% reduction, S is 33,000 psi. Solving for D in these two cases gives 0.0011 in. per in. for the greater reduction and 0.0010 for the smaller reduction. The difference is 0.0001 in. per in.

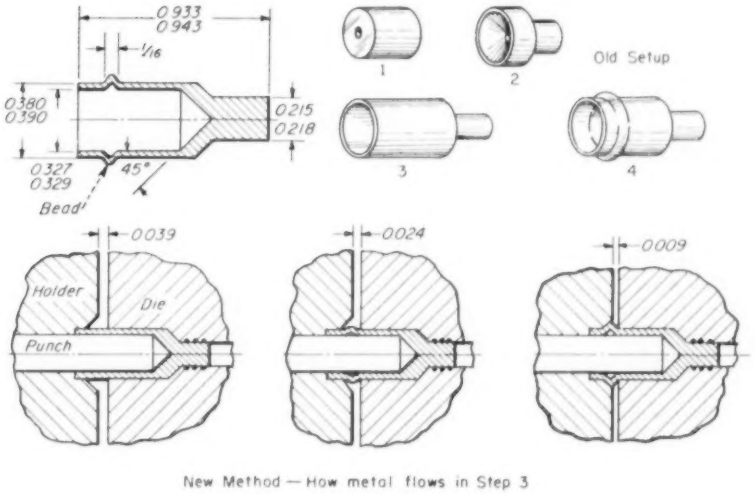
Actually the variation will be much greater because of the different amounts of strain in the tools and press caused by differences in stock. Usually the actual variation is five to ten times the calculated springback. Therefore, to get correct sizing, use stop blocks to insure that the press will dwell at the same point each time. Start with blocks of the same thickness as the finished piece must be, try a few samples, and progressively thin the sizing blocks until the correct part thickness is obtained.

Bending. To bend a piece of metal and make it stay put, it is necessary to cause a metal flow of approximately 3% of the dimension being worked. In other words, if a flat blank is placed between curved dies for bending, and the thickness is not reduced by 3%, the piece will not retain the desired curve.

Pyramiding of Pressure. In sizing operations, an increase in pressure takes place at the center of the piece, because the metal here is surrounded by other metal and has no place to go. The tools deflect more at the edges. Net result is that the central portion is thicker than at the edges. To compensate for this condition, make the dies flat and size some parts, measure the difference in thickness at the center and the edges, and rework the outer section of the dies until satisfactory parts are secured.

Width-to-Thickness Ratio. Ultimate strength of the material and friction between the blank and the tools limit the extent of cold working of a piece. It has been found that friction becomes so great when the ratio of width to thickness exceeds 10:1 as to permit only a feathering of the edges.

Header parts made faster



New Method — How metal flows in Step 3

FIG. 13 .. BECAUSE OF THE BEAD for molding purposes, two machines were needed to head part by old method. Tool modifications enable part to be made on one header

FIG. 14 .. IRON REGULATOR CORE is headed in four steps: 1—point or extrude, 2—head, 3 (not shown)—thin the head and form lobes, and 4—trim the head

Distributor Insert. This piece, which receives the spark-plug wire, is required in enormous quantities. It is made of either copper or aluminum. The original setup involved the use of two double-stroke headers to make the piece in four steps. The first three operations were performed on the first machine, and the pieces were then transferred to a second hopper-fed machine to form the bead. The new method forms the bead at the same time that extrusion takes place. In second view, the bead has been started, and in step three it is completed. The angle that forms the bead must be placed on the punch holder. Small grooves in the carbide die hold the part while the punch is withdrawn.

Regulator Cores. Formerly these were made on automatic screw machines, but are now headed with an 85% saving in material. Furthermore, a more ductile metal is more easily staked.

The cores are made on a 3/8 in. progressive header in four steps, at the rate of 4080 pcs per hr. Under the head of the machined core there was a knurl which had to be replaced with a series of lobes on the headed article. These changes required a few alterations in assembly tools. However, the materials and labor costs saved by heading paid off in four months.

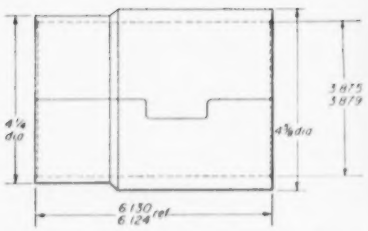


FIG. 15 .. BLANK FOR GENERATOR FRAME has a tongue and slot for locking purposes. After extrusion, seam does not open. Thus, conventional welding operation is avoided

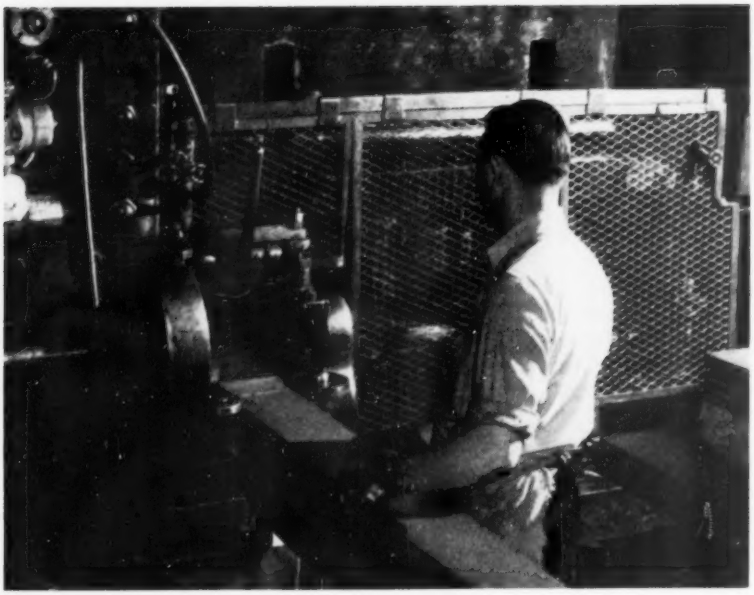


FIG. 16 .. GRIT-BLASTED STOCK is formed into a generator frame in five operations on a transfer press: blank, notch, oxbow, U-form and finish form in half-round dies

Extruded generator frame saves 2 lb of steel

IN addition to saving metal, extrusion of the generator frame produces the hole to size so that no machining of the ID is required. In fact, the ID is more accurate than a bored one for roundness and straightness. Actually, extrusion replaces welding the seam, broaching the weld, boring the ID, and facing one end, as required for the previous frame. The cost savings are considerable.

The generator frame was one of the first major cold-working jobs undertaken at Delco-Remy. Several experimental methods were tried in an effort to produce a frame with a smooth ID that would require no machining. Rotary swaging failed because some of the blanks were made extremely egg-shaped on the first blow and rotated with the dies. Ball sizing with an arbor bulged the metal ahead of the balls, instead of flowing lengthwise as required for sizing. An arbor-mounted roller was no better. Swaging with half-round dies was impractical, because the metal flowed to the center, and an arbor could not be used because of pyramiding pressure. Ironing on an arbor failed to keep the seam closed.

The first attempt at extrusion involved setting the formed cylinder in a die atop a collar and coming down with a stepped punch. Metal flowed upward, or opposite to the direction of applied pressure. However, this method produced stepped ID, which was not desired.

The present frame has ends with a tongue and groove blanked in them. Before blanking, the stock is grit-blasted to remove scale and to hold lubricant. Five operations are performed on the transfer press: cut off, notch, form to an oxbow shape so that the ends will fit square when formed up, U-form, and finish form using half-round dies.

WORKING THE WALLS

For the metal to take a permanent set, it is essential to work it at least 3% in a direction perpendicular to the applied pressure, as mentioned earlier. The original stock thickness is ⅜ in. Where the frame is not extruded, it is worked 9% by thickening the wall approximately 1/32 in. In the extruded area, the thickness is reduced to 3/16 in., or a 50% reduction.

Essential parts of the extrusion die, Fig. 18, are: the carbide extrusion ring, the arbor, and the collar. The extrusion ring has a 1° taper on the OD (smallest at top), and is pressed cold into three concentric shrink rings. These rings are fastened to the bolster with 8 heavy studs. This construction avoids pulling the die apart if the generator frame sticks in the lower die. Knockout pressure is about 40 tons.

The carbide ring is sand-blasted to roughen the surface in order to hold lubricant. This feature reduced the extrusion pressure to 175 tons, or approximately half that required with a polished ring.

The stripper assembly attached to the punch holder acts on the collar to strip the extruded frame off the high-carbon, high-chrome arbor. The knockout is cammed to

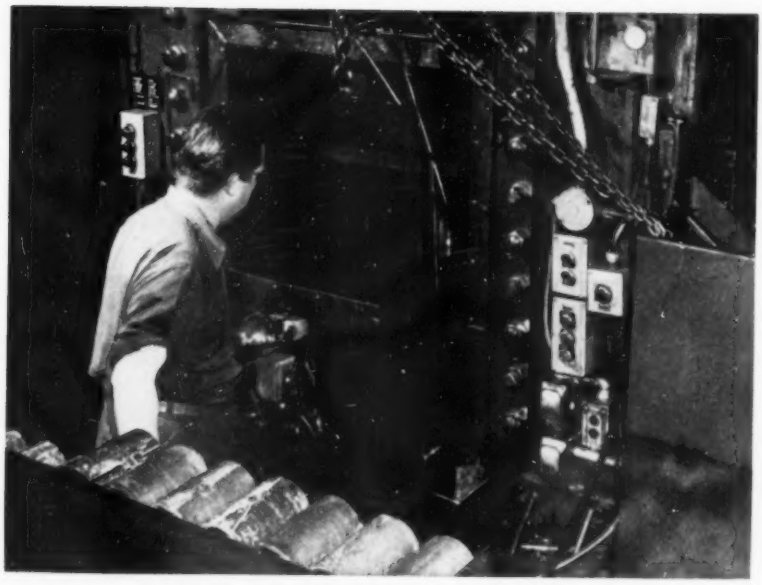


FIG. 17 . . **PLASTIC INCLOSURE** around throat of extrusion press keeps oil from flying. Operator puts frame in chute, and part is picked off by combination loader-unloader.

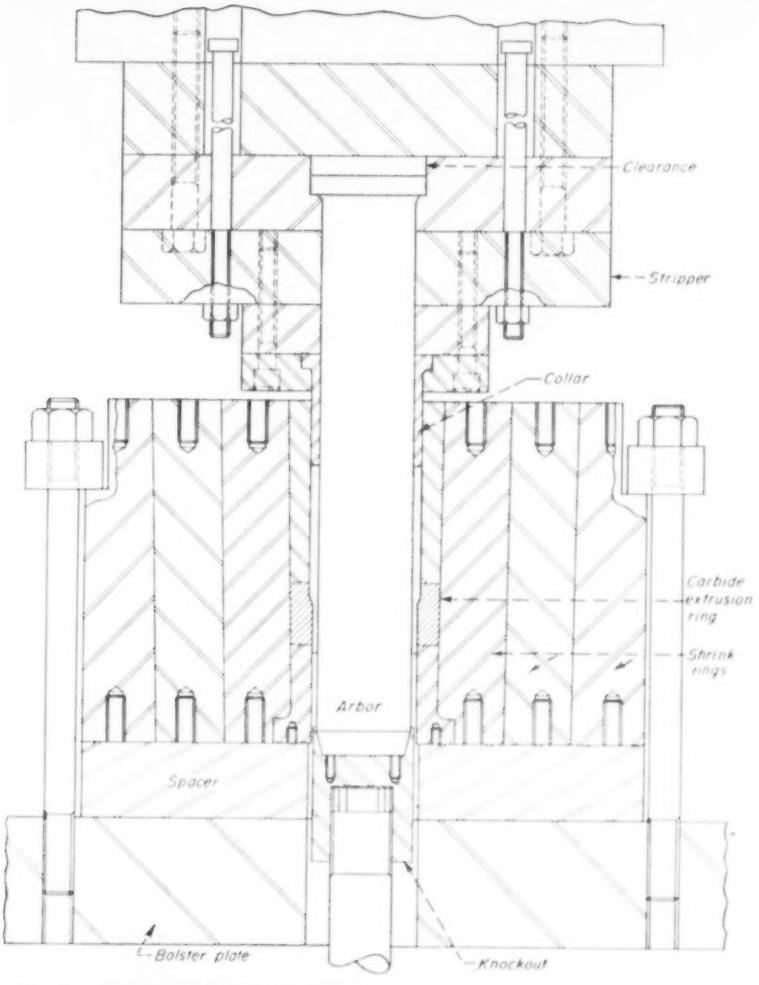


FIG. 18 . . **CLEARANCE ABOVE THE ARBOR** is essential when extruding the generator frame. Otherwise, metal flow rate may exceed ram speed, and the arbor could be torn apart

follow the arbor, keeping the part on the arbor for stripping at a definite height above the die face, so that the work unloader can grasp the piece properly.

It is possible to tear apart an arbor of the size indicated. Clearance is essential above the arbor, so that it can move faster than ram travel. Actually, metal movement in the thinned area is faster than ram travel, hence tension stresses are applied to the arbor in the extruding region by clamping action of the extruded moving metal. Thus, if the arbor could not float in limited clearance, it could be (and has been) torn apart. Other features of the arbor are: The end portion is several thousandths larger than the middle portion to compensate for elastic compression during extrusion, and vent holes are drilled to permit trapped oil to escape. Presence of any trapped oil often accounts for a sharp increase in tonnage for filling out the desired shape in flat-swaging and extrusion jobs.

During the extrusion cycle, the wall thickness of the piece is first increased to $\frac{3}{8}$ in. by upsetting action of the collar. This action occurs when the generator frame strikes the 45° throat in the extrusion ring. Before the metal can extrude, it must fill the annular space between the ring and the arbor, thereby properly sizing the ID of the part at the heavy wall section. A $\frac{1}{8}$-in. land in the extrusion ring is used primarily for a gaging point for sizing the piece, and land of this length is not essential to proper extrusion.

Hollow shaft with extruded ends replaces solid one

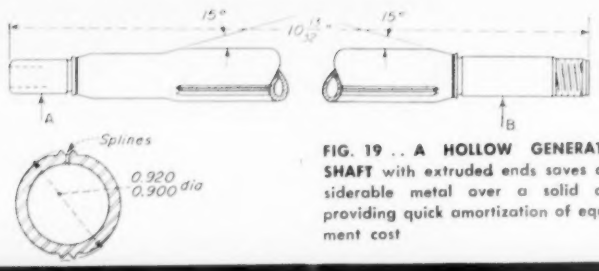


FIG. 19 .. A HOLLOW GENERATOR SHAFT with extruded ends saves considerable metal over a solid one, providing quick amortization of equipment cost

FIG. 20 .. GENERATOR SHAFTS must fit tightly in the dial of the extrusion press. Hence, a loading dial with hydraulic pusher is placed above the press dial

FOR many years, Delco-Remy made its generator shafts on automatic screw machines. Now, instead of bar stock, the shaft is made from welded steel tubing. Both ends of cut-to-length pieces of tubing are reduced in diameter for the bearing fits by a series of extrusion operations. With the new construction, a considerable amount of metal is saved, and more rigidity is obtained in the shaft.

Tubing is produced on a combination roll-forming and welding machine. After cutting to length, the tubes are centerless ground to a tolerance of 0.001 in. in order to obtain a snug fit in work holders set into the dial of the presses.

The two ends of the shaft are extruded separately. Because of the tight fit in the dial, the operator uses a loading dial placed above and in front of the press dial. He drops the proper end of the shaft into the loading dial, and it indexes in time with the press dial. At the transfer point, a hydraulic ram pushes the piece from the loading dial into the empty work holder in the press dial below. As the press dial indexes from station to station, the press ram progressively extrudes the piece. One end receives three extrusions; the other end two extrusions. Note: the second end is extruded in a second press setup.

Extruded shafts fit so tightly in the dies that a hydraulic ejector is necessary. Dies have a tapered throat, 15° per side, and the balance of the hole is straight.

These are the operations performed on the two ends:

End A—Two extrusions and a shear. The first extrusion produces the larger diameter; the second extrusion makes the smaller diameter at the end. To produce an oil slinger, shearing pushes up metal at the end of the taper.

End B—Three extrusions are required because the reduction is too great to obtain the larger diameter in one pass, without buckling at the junction with the body of the shaft. Hence, the larger diameter is obtained in two passes. The third extrusion produces the step for roll threading, the metal being extruded to the thread pitch diameter. Shearing follows to produce a shoulder.

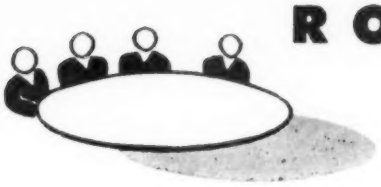
In all cases, the extrusion pressure amounts to only a few tons per operation because the shaft is hollow and metal moves easily.

Elongation of the shaft as the result of the several extrusion operations amounts to ¾ in. Wall thickness of the tubing is 0.083 in. Some thickening takes place at the extruded sections. In general, the thickness of the extruded sections is 0.090 in., which provides metal for grinding the bearing fits without weakening the shaft.

The splines on the generator shaft are another example of a cold-working operation. After all machining of the shaft is completed, the splines are produced by two fixed forming rolls and a ram pushes them through. The rolls have half-round profiles to contain the shaft and prevent its collapse. No arbor is used.

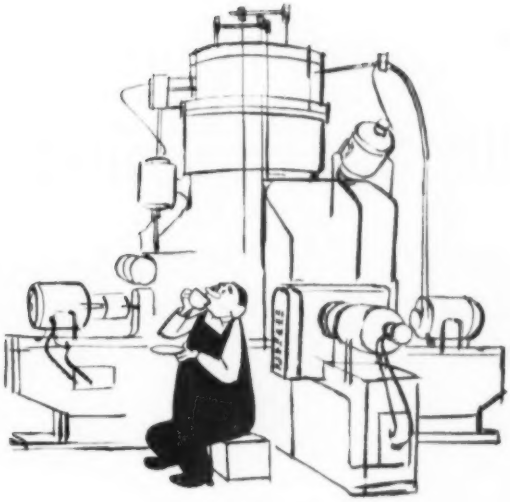
On the solid shaft, a knurl was used to hold pressed-on laminations on the shaft. In some cases, the knurled edges sheared the laminations and did not hold them.

The Woodruff Keyseat is pierced, or lanced, before grinding, leaving a strip of material that supports the key and prevents it from being forced too far into the shaft interior at assembly. This operation saves many thousands of dollars annually in respect to keyway gutters.



ROUND TABLE

Coffee Broke



"Al, I'm beginning to think that this idea of coffee time is getting to be too good a thing for the boys; they're taking advantage of it."

"In what way, Ed? The idea originated you know because it was felt that a rest period from labor would result in greater production."

"You're right there, and I don't see why it wouldn't if the employees would take the time as originally established."

"Don't tell me, Ed, that you'd have them punch a time clock in and out for coffee!"

"No, not exactly, Al; but I don't see why if the company is good enough to provide the workers with time out for a little relaxation that they don't accept it in the spirit in which it is given and cooperate by not dragging out the time. Seems to me that they should jump in at the end of the ten minutes allotted and go to work as they should."

"Now don't go getting penny-wise and pound-foolish, Ed, just because a few of the fellows take advantage."

"Pound-foolish, hell! I've been doing a little figuring and it comes to me that they waste enough time to provide two weeks vacation, extra, for every employee in the plant."

"I think you're stretching it a little, Ed."

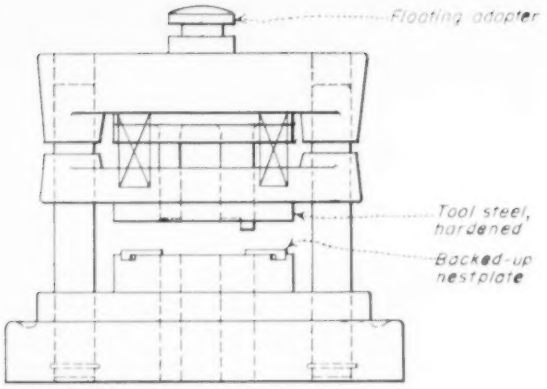
"I am not! Why, do you know that the habit is getting to be so ingrained in some that they take time out, on company time, to have a little nip before they start to work in the morning?"

"Can't see that a few minutes will help in that case; maybe some of the boys have had to leave home in a hurry in the morning and haven't had their little bracer. You wouldn't want the poor guys to go without their morning sendoff, would you?"

"No, I wouldn't; but let them have it on their own time."

***WHAT ABOUT THE COFFEE BREAK**—is it good or bad? Is it the tendency for workers to take a mile when given an inch? Does the average man work harder to compensate for such concessions? Your ideas and opinions on this problem will interest others. Discussions of earlier topics appear on later pages.*

FURTHER THOUGHTS ON SHAVING DIES



TYPICAL SHAVING DIE

Based on experience with cash-register and camera-shutter parts, Herr Loeffler differs with Paul Prikos (*AM*, Feb 16 '53, p 144). He presents the current European position on shaving, including a new type of Swiss press

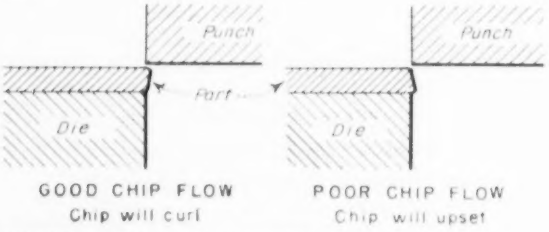
BY OSKAR LOEFFLER, MUNICH, GERMANY

Shaving dies are intended to produce smooth edges on stampings in a second operation while at the same time improving their exactness. This is the reason for the well-known requirements of rigid construction, precision and first-class workmanship.

Up to date, very little has been published on the subject of shaving dies, and even in special literature it is mentioned but briefly. Only a few firms seem to be experienced in designing and building intricate shaving dies. As tool engineer in one of Western Germany's leading toolmaking firms, I am much concerned with shaving dies built to customer requirements, especially for component parts of cash registers and camera shutters.

CRACKS MAY OCCUR, particularly on soft material, during shaving because the radius from blanking gives way

WHEN BLANKED PARTS are shaved burr side up, a new and dangerous burr may be created



SHAVING with burr side down gives better chip flow

Through profound discussions of the problems which arise, I finally came to conclusions which in some respects differ greatly from the principles given in Paul Prikos' article, but my findings too are backed by experience. I should like, therefore, to present these differing points of view.

Shaving in one operation has proved economical up to 0.10-in. stock thickness. To obtain a 75% smooth edge, an allowance of 7% stock thickness on each side has given best results. The companion blanking die must be built with minimum clearance between punch and die along the edges to be shaved. If possible, some harder grade of material should be used for component parts requiring shaving, as because of its lower ductility the shaved chip won't be so readily upset.

Most important in shaving is the question of which side should up. A component part placed in the die burr side up certainly contacts the die face properly, but the radius resulting from the blanking operation will not be backed up sufficiently; thus on the downward stroke of the punch it will give way, resulting in a crack along the shaved area about 1/3 stock thickness up from the radius. This happens especially when edges lying under a pointed angle are shaved, eg, lock-pawl tips, gears with pointed teeth. Still more important is the fact that when shaving is done this way the component part receives a new burr (sketch) which will readily break away when the part is assembled and in use. Furthermore, I conceived that placing the part into the shaving die burr side down will result in much better chip flow as the chip's cross-section is diminishing. If the part is placed burr side up, the chip will produce a new

break by being upset during shaving. When a shaving station is incorporated in a progressive die, shaving must of course be done burr side down.

Parts that require shaving of outside contours and holes should be blanked with a compound die, as in this case the burr sides lie on the same surface. If blanking is performed in a progressive die, the shaving die should be designed so that on the outside contour the burr side is down; in shaving holes it is easier to achieve suitable results with the burr side up than on outside contours with the burr side up.

Here are some pointers to keep in mind when designing shaving dies:

1. For shaving the whole outside contour of a component, shaving dies of compound design are best suited, but without a stripper plate, as this helps to upset the chip and makes its removal difficult. For this case it is of advantage to pierce two locating holes in the part and to locate it on pins in the punch. After shaving, the part is removed from the punch by trigger-operated ejector pins.

2. For all other cases, shaving dies should have movable pin-guided stripper plates (to insure guidance of punches until the surface of the component part is contacted), as well as pin-guided punch pads. Guide pins should not be on the back of the dieset but on a centerline or a diagonal of the die block.

3. Whenever possible, shaving punches should have heels.

4. Sectional design of the die block is advisable to make contour grinding possible.

5. Nestplates must be as rigid as possible and backed up in milled slots.

6. All shaving dies should have floating adapters to apply pressure centrally and avoid tilting of upper die members.

7. Back taper should be 15 minutes max. each side.

8. Clearance between punch and die should be a slide fit.

9. In small shops, it is the practice to build the shaving die first, then to blank a few parts of thin sheet and to make the blanking-die block according to these parts and to fit the blanking punch into it. If contour-projecting facilities (optical comparators) are available, both dies may be built simultaneously, but even then it is of substantial advantage to give both dies to the same diemaker so he can compensate for occasional small differences.

That is where shaving stands today in Germany, but there is a trend toward performing shaving operations on vibration presses, built in Switzerland by Samuel Allemand. These use two rams, a big one for the main stroke and a smaller one built into it which starts on its vibrating downstroke when the big ram is in its lowest position. Each vibration feeds it about 0.004 in. down. The only handicap in the principle is that it takes about 10 times as long as conventional shaving.

Tips

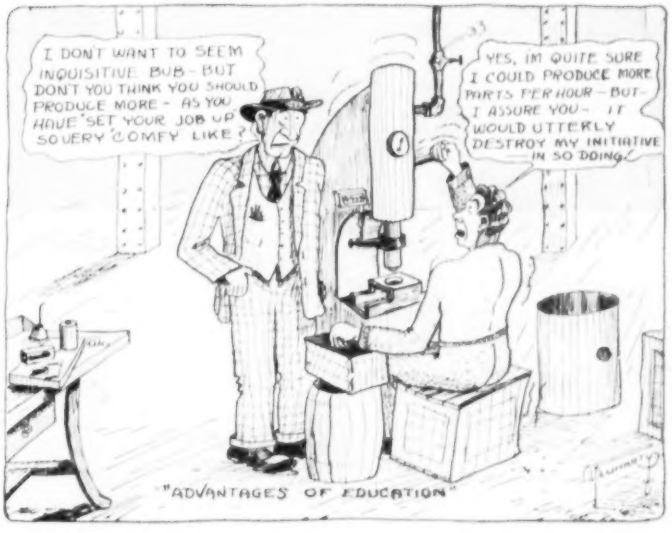
FOR TOP SHOP MEN

463 One advantage of the pioneer—the man who dares to try something new—is that he's in the van if it works. He takes brickbats, but they come from the front, and he can see them coming. And he also gets the bouquets. The conservative—or follower—is pushed into any advance, and has a hard, uphill fight to re-establish his position in the field.

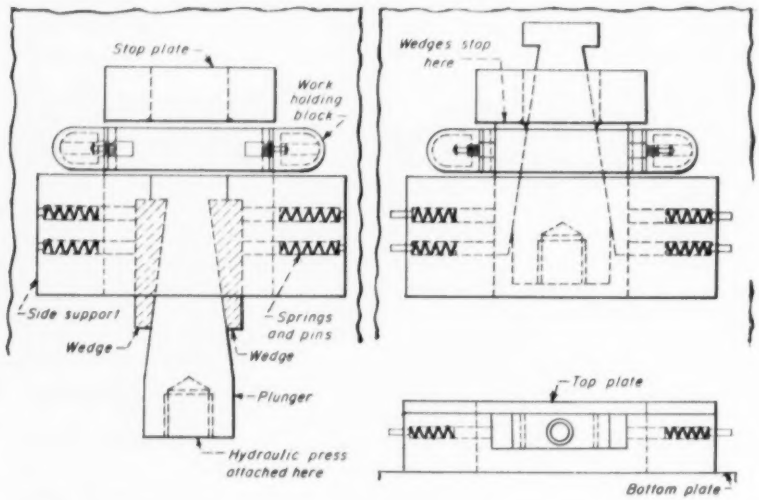
464 Convert the crusader into a help rather than a hindrance. He's the boy who brings to your attention the gripes of everybody else, or the guy who suggests a change in method and adds in his own opinion of the stupidity of the fellow who figured out the present method. He becomes a mouthpiece for the sheep if you don't build him into a real leader—or expose him as a fake.

465 Try to be objective under all circumstances. It is hard to separate the gripe and the griper, the idea from the man, but unless you do, you're guilty of bias. You must not let a man's attitude in general influence your opinion of a particular job or idea. Your ridicule or disapproval will make the man clam up—and accentuate your differences.

466 Fireworks should always be set off by a trained person. If you're inclined to set 'em off, learn first where and when it can be done safely. Perhaps you can skin a man alive one minute and forget it the next — but chances are, he can't As has been said before, "the punishment should fit the crime," and few crimes justify throwing inkwells or cold-rolled bar.


I DONT WANT TO SEEM INQUISITIVE BUB - BUT DONT YOU THINK YOU SHOULD PRODUCE MORE - AS YOU HAVE SET YOUR JOB UP SO VERY COMFY LIKE?
YES, IM QUITE SURE I COULD PRODUCE MORE PARTS PER HOUR - BUT I ASSURE YOU - IT WOULD UTTERLY DESTROY MY INITIATIVE IN SO DOING!
"ADVANTAGES OF EDUCATION"

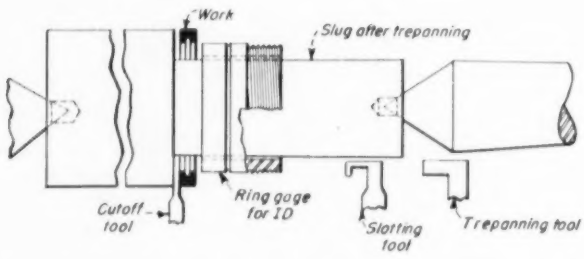
Practical Ideas



Hinge Assembly Fixture

Our problem was to insert two pins, 1 on either side, in a special hinge. We evolved a fixture which drove them into place simultaneously in 7 seconds. Two blocks were securely fastened to a bottom plate, having been machined to receive an operating plunger and a pair of wedges. The forward block acted as a stop plate. The rear block was equipped with 4 spring-loaded pins, two to a side. The blocks were separated by a third block, with studs, onto which the hinge was clamped, and the pins were loosely inserted.

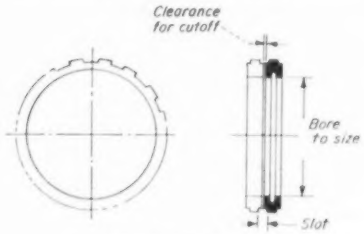
A hydraulic cylinder supplied power to the operating plunger and sent it forward, carrying with it the flanking wedges. The wedges were stopped by the forward block, but the plunger still progressed, causing the wedges to exert lateral pressure against the pins, driving them into place. *Irving Berkowitz, Brooklyn, N Y*



Single Setup for Producing Keywheels

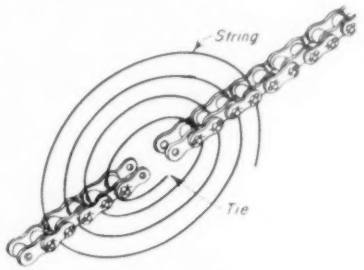
A number of brass keywheels can be produced out of a piece of bar stock with a single setup. The bar stock is first centered at both ends on a lathe, then it is finish-turned, knurled, and slots are milled, all according to specifications. If numbers are needed, they are stamped on at required intervals and the notches are turned.

The next operation is trepanning the inside bore of what is to be the first wheel. The trepanning tool, of course, is held by the toolpost. A ring gage is used to check the I D following the cut and then slid back onto the tailstock center.



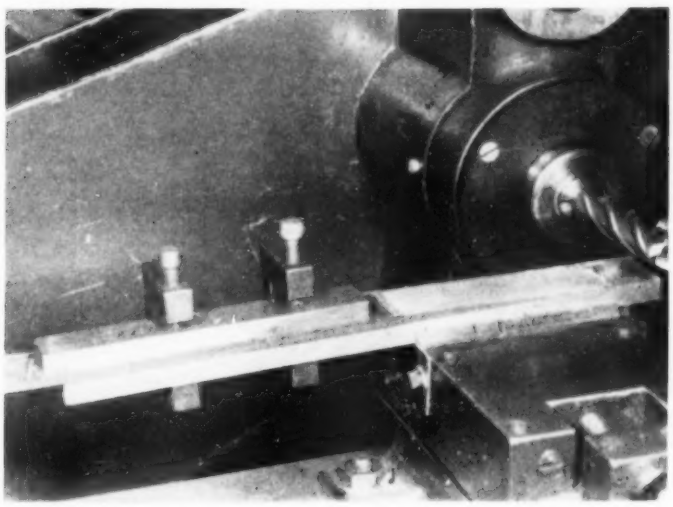
Brass keywheel

A hooked slotting tool fashions the internal groove, and the first unit, or wheel, is cut off. Trepanning and slotting are repeated on the second unit and so on until the stock is used up. *C Y Lee, Tai-Chung, Taiwan, China*



Connect Ends of Roller Chain By Lacing With Drawstring

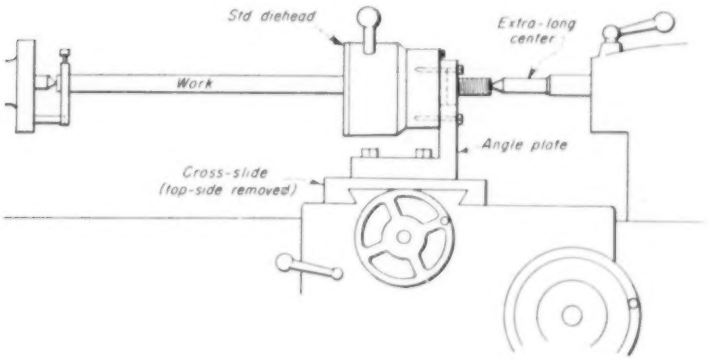
Sometimes, because of weight or an unavoidable improper center distance, it is very difficult to bring together the ends of a roller chain prior to connecting them. The work can be simplified by lacing a length of chalk line or wire thus: Start next to the link to be connected and pass the string through the spaces between successive rollers, as shown, working outward to form a series of ever-larger loops. Keep the string taut. In effect, this arrangement is equivalent to a block and tackle. With enough loops, a tremendous pull is exerted on the chain. *James J Mc Dowell, Atlanta, Ga*



Joining Setup for Machine-Tool Belting

Preparing the ends of a leather belt for cementing, the best method for joining a leather belt, is a difficult operation to perform without the proper equipment. A simple setup in a small miller will produce a long, flat, tapered section, to a feather edge, at the belt ends.

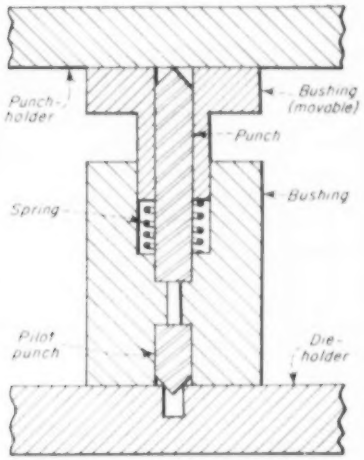
The belt to be joined is clamped to a strip of soft metal, with a back-up strip of similar material along the rear edge as shown. A very sharp right-hand-spiral end mill is used to make the single cut desired. The right-hand spiral holds the belt against the back-up strip during cutting. After the cut is taken, the belt can be cemented and clamped in the usual manner. *J C Magee, Schenectady, NY*



Threading Extra-Long Stock

By removing a self-opening die head and fastening it by an angle plate to the apron of a lathe after the top-slide has been put aside, enough room is gained so that long pieces of stock may be threaded without going through the usual tedious procedure of pulling the bar through the chuck, section by section, and allowing the bar to pass through the turret-head bores.

In making this setup, a tailstock center long enough to reach through the diehead must be used. *Allen Clarke, Rochdale, Lancashire, England*



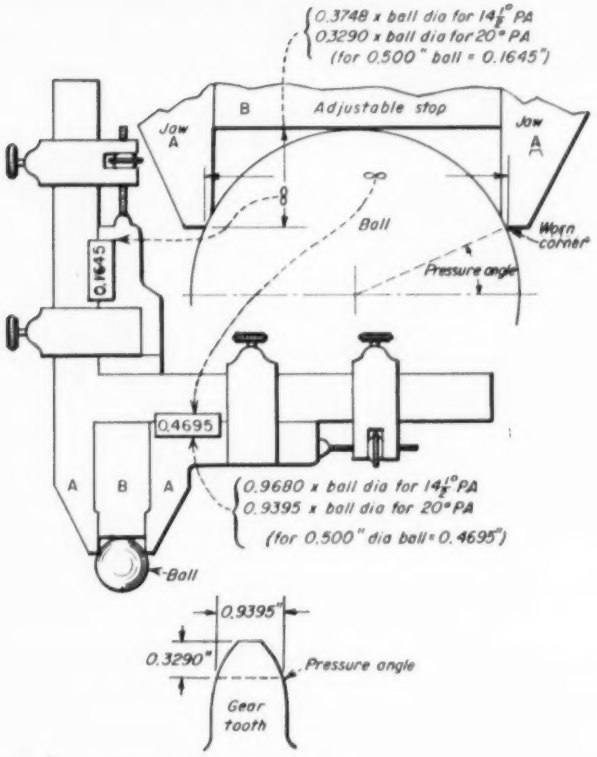
Tool Transfers Blind Holes From Piece to Piece in Dieset

Diemaking frequently requires that the toolmaker transfer the location of internal blind holes from one member of the tool to another member. When the holes are threaded, transfer screws can be used but some holes are not threaded.

Here is a special tool, easily made and simple to use, which will quickly and accurately transfer hole centers. It consists of two bushings, one stationary and containing the pilot punch pressed into its base. The other bushing is movable within the first bushing and a reasonably strong die spring is placed beneath it. A long second punch is also inserted in the first bushing. It passes through the core of the second bushing.

The stationary bushing is moved over the hole to be transferred until the pilot punch in its base centers on the hole. Then the upper die member is brought down against the movable bushing until the punch within it makes the indentation.

Of course, the movable bushing should be within the stationary bushing when the punch holes are drilled and the punches must be absolutely perpendicular to the base of the stationary bushing. *Federico Strasser, Santiago, Chile*



Checking Accuracy of Twin-Vernier Calipers

When twin-vernier calipers, used on gear work, are new, the corners are sharp and a gageblock between the jaws suffices as a check. However, the narrow lines of contact rapidly show wear and a time comes when a more accurate test is imperative.

A steel ball is the best medium for this purpose. The ball should not be less than 0.500-in. dia because the radius of curvature of a smaller ball is much less than that of the average gear tooth and the contact conditions of the ball should approach that on a gear tooth.

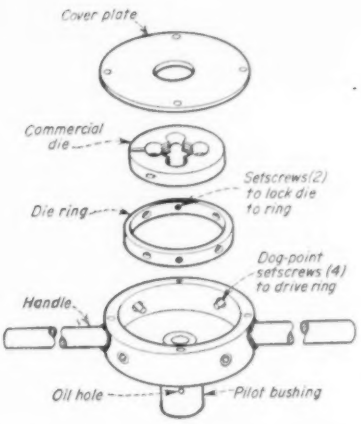
The ball is placed on a flat surface and the caliper is placed on top of it after adjustment according to the formula which is given on the accompanying illustration.

If the jaws are squeezing too tight, the ball will roll at the caliper corners and slip at the addendum plade. If the jaws are open, the ball will roll at the addendum blade and slip at the caliper corners. Experience has proven this to be an infallible test; and the too-tight or too-loose conditions are readily ascertained. If the caliper shows these signs of wear it should be returned to the manufacturer for reconditioning. *Joseph E Van Acker, Basking Ridge, N J*

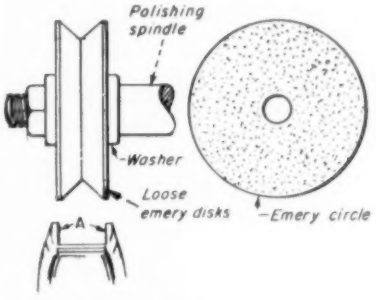
Pilot Bushing For Threading-Die Holder

In using a commercial threading-die holder in precision work, the operator frequently encounters difficulty in meeting the work squarely. The result is that the first few threads undercut the OD of the stock, or, on long pieces, the screw gets out of line.

I constructed a die body with welded handles and fitted it with a pilot bushing. Into the body I placed a fitted die ring on the diameter of which were a series of holes to receive and hold a commercial die. This die was held by a cover plate. Chip-clearance holes were made in the body and an oil hole drilled in the pilot bushing.



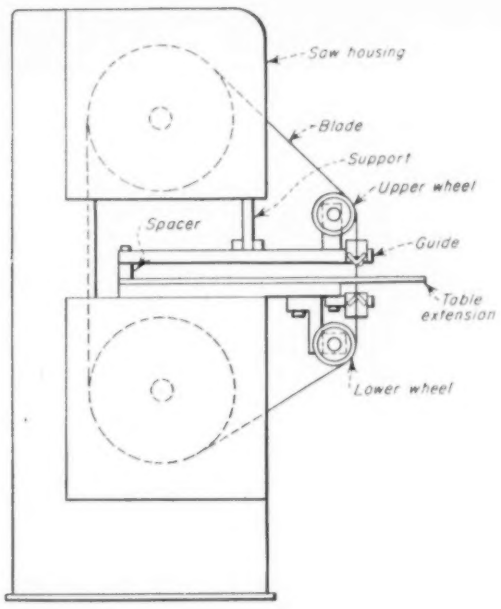
With this tool I was able to insert the work in the pilot bushing and the commercial die centered itself on it and continued centered until the threading was complete. *Adam J Rasys, Southbridge, Mass*



Polishing Wheel For Small Work

This setup may prove as helpful to other watch and small instrument polishers as it did to me.

The problem of polishing lugs inside watch faces (A) was solved by machining down a polishing spindle and fitting it with a pair of tapered steel disks so placed as to form a grooved inner surface. Emery circles were loosely fitted to the outer surfaces of the discs. The discs made a firm background for the operation and the groove permitted the grinding circles to be lowered to the desired depth. To prevent burning, only one lug was polished at a time. *Frank Spicer, Leeds, Yorkshire, England.*



Homemade Table Extender Increases Bandsaw Capacity

Like most jobbing shops, we are often forced to turn down work which is otherwise attractive but exceeds the capacity of our equipment. Recently, we were about to turn down a job which called for a considerable amount of contour sawing on aluminum plates. The job was very enticing so we reconsidered and decided to do something about it.

We increased the capacity of our bandsaw from 16 in. to 26 in. by adding a few parts. A ½-in. thick plate 12 in. wide was fastened to the table with flush flathead screws. The teeth were turned off two old 6-in.-dia cast-iron gears and bronze bushings were pressed into their bores. Rubber tires were made by slicing circles from an inner tube, then stretched over the wheels and fastened with a little cement. Wheel shafts were turned at the ends of square stock and this stock was bolted to a piece of angle iron which was, in turn, fastened to the lower side of the saw table. The lower saw guide was removed from its original location and was bolted to this plate.

A length of 1½-in.-sq crs was bolted to the inside edge of the table with a suitable spacer in between the bar and the table. This bar was also supported by bolting it to the regular upper saw-guide support bar. The upper saw guide was attached to the outer end of this bar, directly above the lower guide. Also mounted on this bar are the second wheel and axle, with the wheel edge in line with the saw guides. Having the axles turned on the end of square stock makes adjustment simple—by shimming the axle or shifting it on the screws. Adjustment is necessary to get the blade to track properly. The upper door of the saw housing is blocked open to permit the saw blade to reach the auxiliary wheel. A hole is drilled in the sheet metal so the blade can pass from the lower wheel to the main drive wheel.

Before the blade is welded, it is passed through the hole in the table and through the hole in the sheet-metal wall below the table. We have successfully used this attachment many times since it was first applied. *C Molloy, Bronx, NY*

Spotwelder Works Well As Demagnetizing Tool

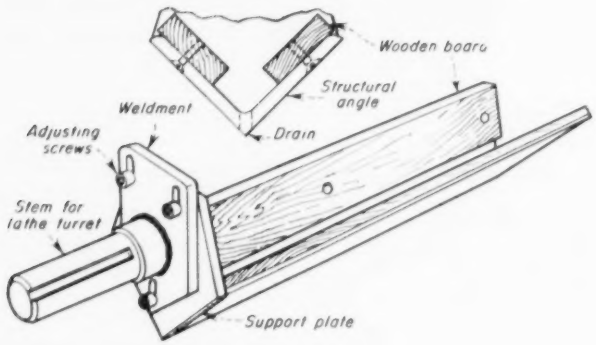
One day recently we found it necessary to demagnetize a tool and, not having a conventional unit which was satisfactory for the job, we decided to make use of a spotwelder. The result was excellent.

It is essential that welding current continuously flow through the horns and electrodes for a sufficient length of time to permit moving the piece to be demagnetized from a point about two ft from the horns through the horns gap and out to a point about two ft beyond or back to the original starting point. This abnormally long "on" time can be obtained by placing a block under the foot treadle, to prevent the switch opening for the cooling cycle, if the welder is manually controlled. When a timer is used with the welder that cannot be used for at least a 30-sec cycle, it will be necessary to wire around the timer. Two or more thicknesses of steel should be placed between the welder electrodes, thus limiting the current to approximately the normal value.

The size of the piece which can be demagnetized is limited in cross-section only by the area created within the horns, electrodes, and throat of the spotwelder. Part length is limited by the time required to pass the piece completely through the active magnetic field. If welding current stops, or is restarted, while the piece is in close proximity to the horns, magnetism may be increased rather than removed. Magnetizing can be done by placing the piece within the horns and then using a very short welding cycle. A 5 KVA spotwelder is adequate for most work. *A N Montgomery, Montgomery Mfg Co, Owensville, Ind*

Save Your Files

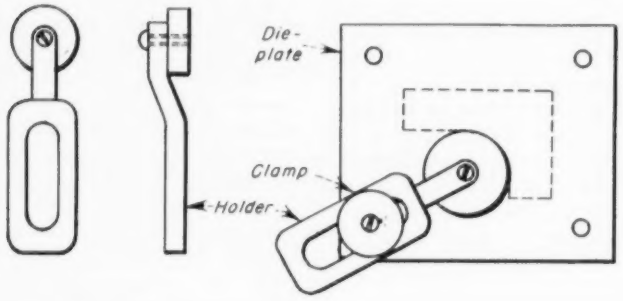
You can save a good set of files for a long time by keeping them on a board—any kind of wood—instead of in a metal box or shelf. Give them plenty of space so they won't get jumbled up. *C Koskiocheckowitz, New York, NY*



Bar Stock Cut-Off Catcher

The hands of most turret lathe operators show evidence of mashed fingers or other injuries received from catching the heavy pins cut off after necessary machining operations have been performed.

Illustrated is a catcher which fits into one of the hex-turret stations. It will quickly prove to be a very practical adjunct as well as a great saver of time and temper. It consists of a structural angle lined with wooden boards. The angle is welded to a plate, and the weldment, in turn, is bolted to another weldment that consists of a round bar and a matching plate. Elongated holes in one weldment allow proper height adjustment. *H G Frommer, Milwaukee, Wis*



File Guides Save Time; Improve Work Accuracy

When accurate work, such as the blanking openings in a die plate, must be performed by hand filing, a filing aid is helpful.

Many toolmakers drill a small hole in the center of the round guide, and a second hole at the center of the arc radius, then connect the guide to the die plate with a snug steel pin. This practice is not recommended because it creates additional danger of cracking during hardening by introducing an unnecessary hole close to the die opening. Other mechanics clamp the disks with parallel clamps or C-clamps, which are clumsy to handle.

As every die plate contains a few auxiliary holes for clamping or alignment which are not precisely located, we drill and tap a small hole in the center of the guide and fasten the guide to a holder. This holder is then clamped, with an ordinary machine screw and nut, through one of the auxiliary holes. *Federico Strasser, Santiago, Chile*

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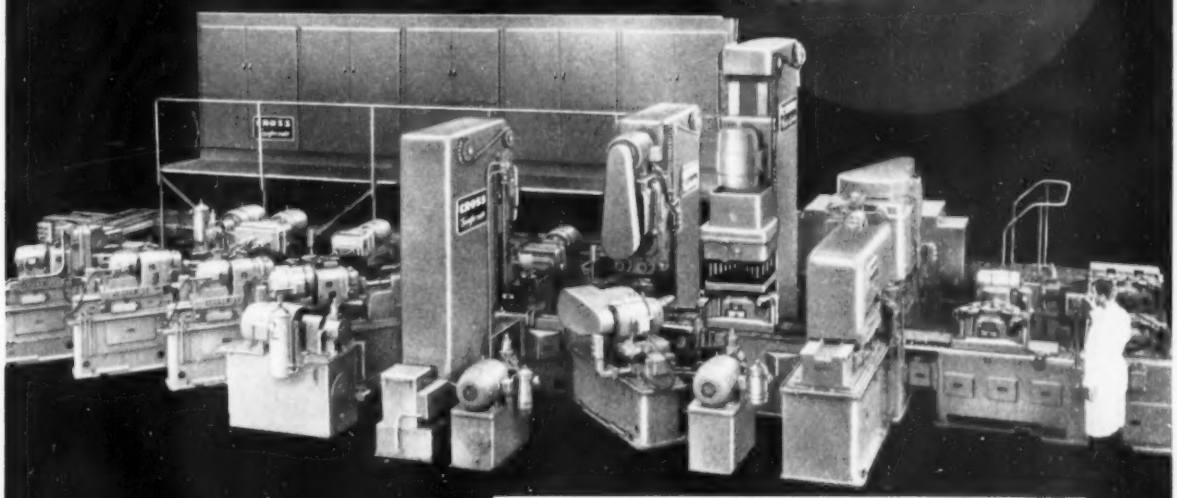

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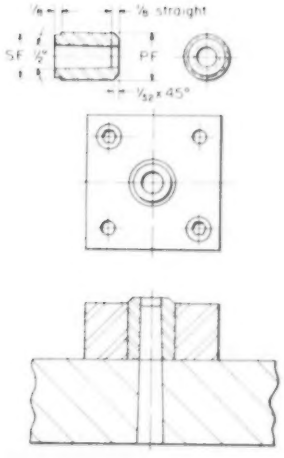
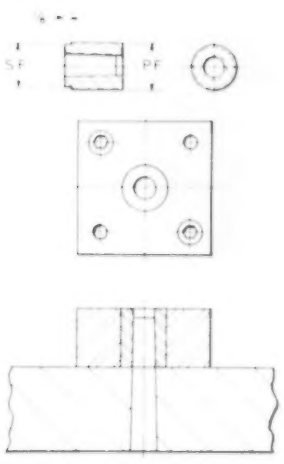
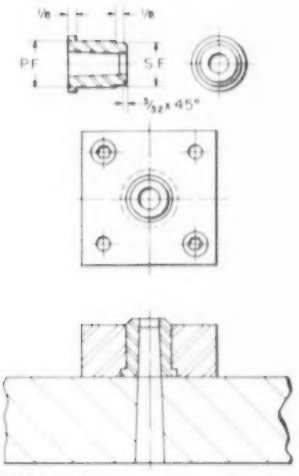


STRAIGHT BUSHING. The straight, press-fit type of bushing is commonly used, particularly for large dies, to conserve tool steel. Should the die hole become chipped, replacement of the bushing is simple and economical. Grinding down an entire die block to remove a chipped spot in one of the die holes considerably shortens die life.

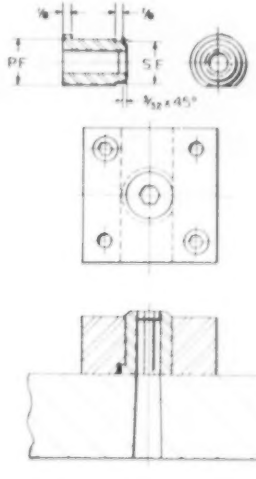
The bushing is made slip fit for approximately ⅛ in. at its lower end. This assures correct alignment while pressing, an important feature for accurate center-to-center distances between holes. Inside of the hole is ground straight for ⅛ in; the remainder is given ½° included angle for correct slug disposal



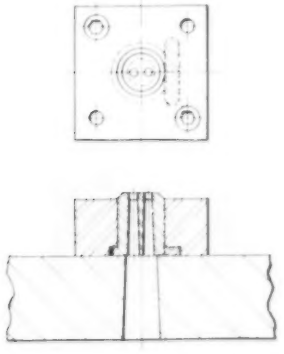
FLUSH BUSHING. If there is a possibility that the part might become dished, or otherwise marked, by the protruding end of the bushing, the bushing is ground flush with the top of the die block. The flush-type bushing is commonly used in secondary-operation dies for formed and drawn parts; also, where heavy spring strippers are used to hold down the blank or strip. Otherwise it is made in the same manner as the straight type



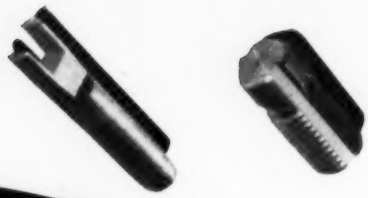
FLANGE TYPE. For heavy cuts through thick stock, the flange-type bushing provides a greater seat area, with less possibility of the bushing sinking into the die holder under the cutting pressure. It is also used where upward pressure exists. Such pressure might eventually raise the bushing if no positive means, such as a shoulder, were provided to retain it. Since this type of bushing is pressed in from the bottom, the ⅛-in. slip-fit portion is applied to the top of the bushing for accurate starting

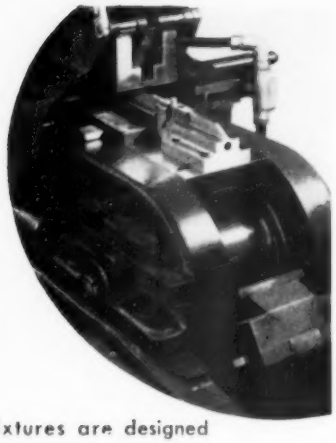


FLATTED BUSHING. Die bushings used to pierce holes of irregular contour are radially located by grinding a flat on the bushing flange. The flat bears against one wall of a milled slot in the die block. This positively keeps the bushing from turning. Because there are no frail parts or dowels to become loose and drop out, this construction is recommended for first-class dies



DUPLEX-HOLE BUSHING. Small holes close to each other may be incorporated in a single bushing. In this case, a key located in an end-milled slot in the die block locates the bushing radially. This method is often used for multiple-station progressive dies where space is limited. Where more than one hole is incorporated in a bushing, it should be made of a non deforming, oil-hardening tool steel





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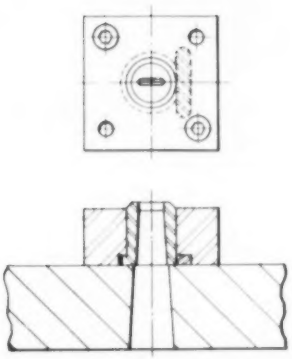
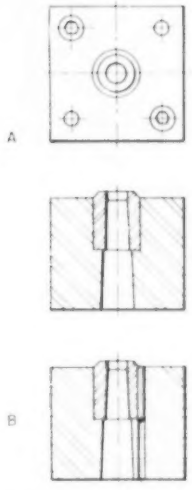
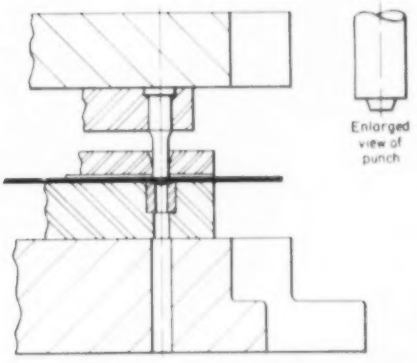


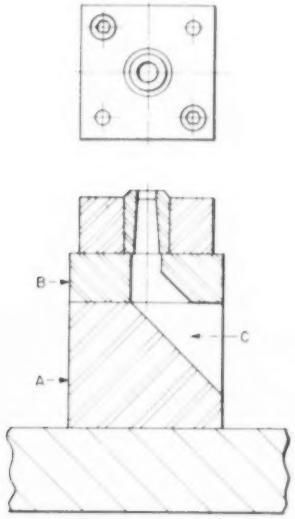
NON-CIRCULAR OPENINGS. Many irregular bushing openings will indicate use of sectional construction for ease of manufacture. Here, an elongated slot is ground in a flange bushing made in two halves. The bushing is kept from turning by a flat ground on the flange and a key. Parting line of the bushing should be at right angles to the key. Tapered slug relief is applied in the same manner as for solid bushings



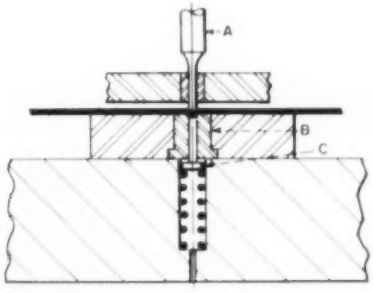
BUSHINGS IN DIE BLOCK. When the die has a thick section, the bushings are pressed in counterbored holes in the die block, as shown at *A*. The through hole in the die block is relieved to a ½° angle, as is the hole in the bushing. This prevents possible jamming of slugs. At *B*, the hole in the bushing is of irregular contour. Hence, the bushing is kept from turning by a "dutchman," which is pressed half in the bushing and half in the die block



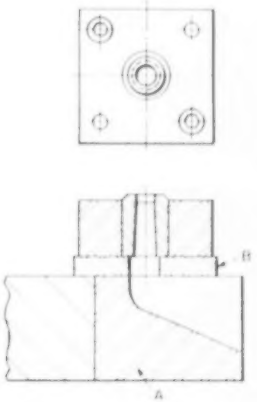
WELD PROJECTIONS. Projections for resistance welding are applied to the strip with a punch having a truncated cone machined in its end. Either plain or flange bushings may be used. In this instance a flush-type, press-fit bushing has been employed. The strip is raised for movement to the next station by two spring-loaded pins (not shown) applied at opposite sides of the bushing. A spring-loaded knockout pin can also be applied for raising the strip



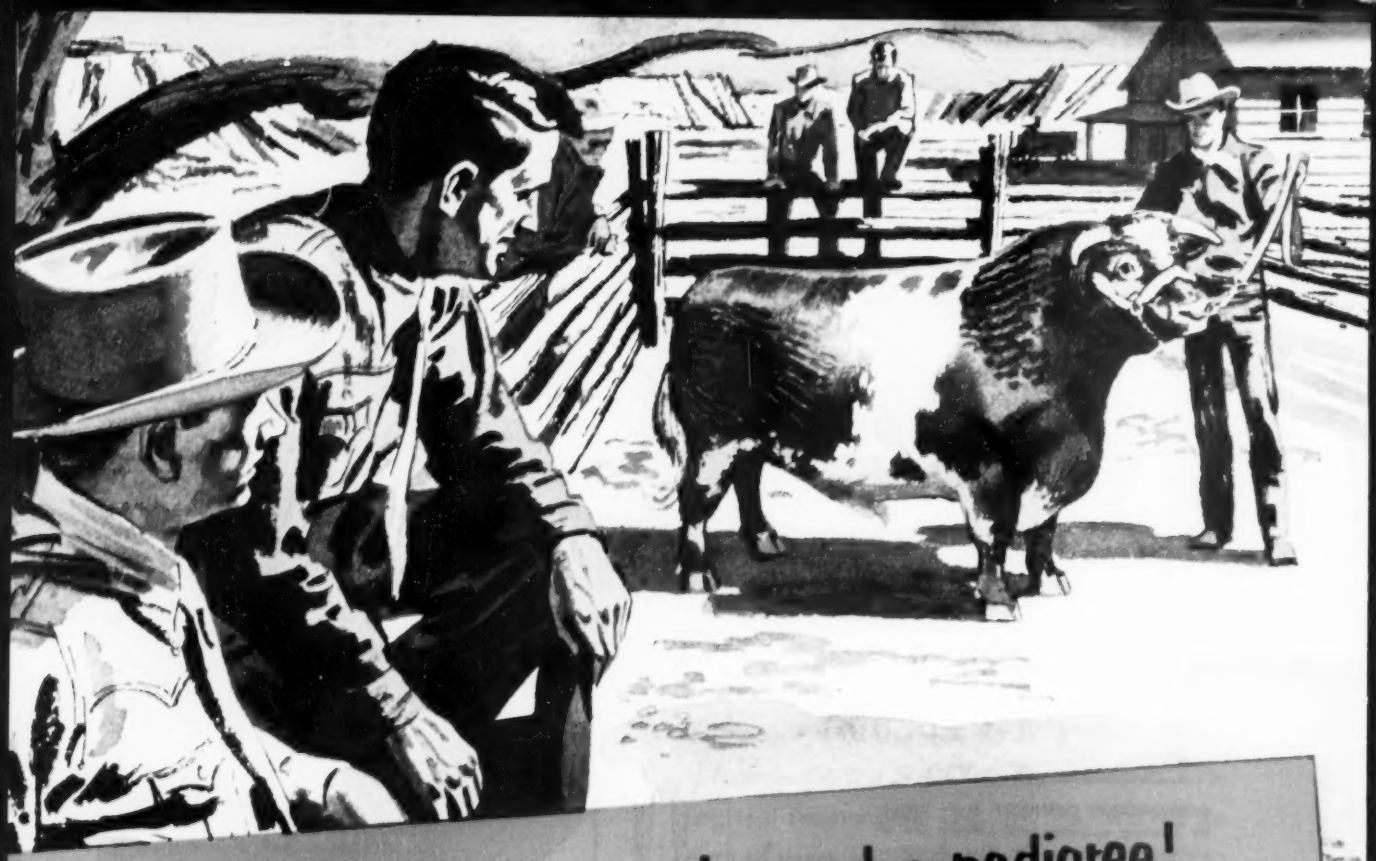
SPACER BLOCK. This type of retainer construction is used when the part has ears, or lugs, high above the surface of the die holder and these must be pierced. Spacer *A*, fastened to the die holder, is of suitable height to accommodate the part to be processed. Spacer *B*, relieved as shown for correct slug flow, supports the bushing above the slug deflecting slot *C*



KNOCKOUT PIN. Partly punched out protrusions are often used as locating dowels for later assembly with other components. Piercing punch *A* partly punches a slug into bushing *B*. When the press ram goes up, knockout pin *C*, backed up by a heavy spring, pushes the slug out of the bushing for movement of the strip to the next station. Because there is considerable upward pressure applied to the bushing in raising the slug, a flange type is used



SLUG CHANNELS. When laying out large dies, slugs must often be chanelled out through the side of the die holder. This happens when the hole in the bolster plate is small for the size of the die set, and the solid portion of the bolster is directly under the die bushing. A slot is milled in the side of the die holder and a spacer *A*, fastened in this slot, deflects slugs to the side of the die. A hardened plate *B* supports the bushing over the slot



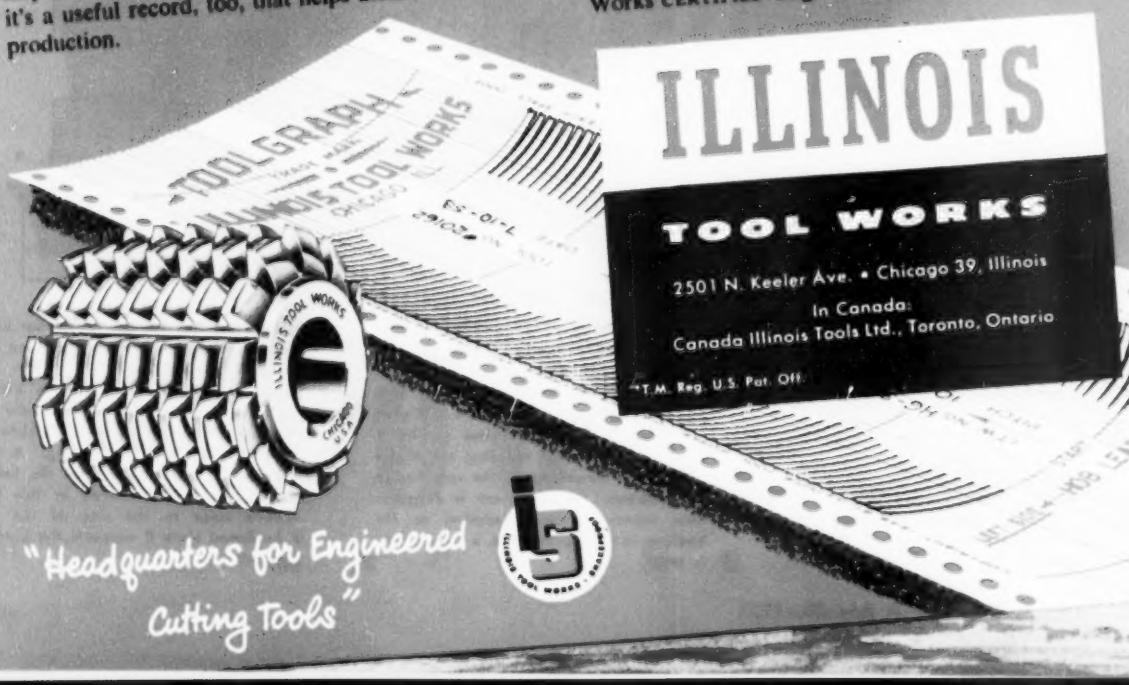
SMART RANCHERS demand a pedigree!

SMART HOB BUYERS DEMAND A *CERTIFIED* UNGROUND HOB!

The TOOLGRAPH* Chart which accompanies every Illinois Tool Works CERTIFIED Unground Hob is an electrically produced "certificate" of accuracy that shows the exact alignment of each hob tooth in relation to the other teeth. It's a positive, *visual* inspection record, not subject to human error and it's a useful record, too, that helps assure efficient production.

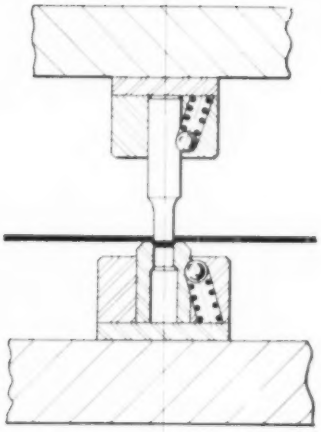
Yes, the TOOLGRAPH Chart is actually a CERTIFIED Unground Hob's pedigree, proof of real value. It's typical of the many *plus* values that design ingenuity, metallurgy, production skill and experience add to *every* Illinois Tool Works cutting tool.

Smart hob buyers, like smart ranchers, demand a pedigree. That's why they specify Illinois Tool Works CERTIFIED Unground Hobs!



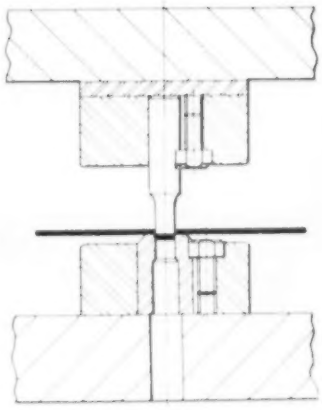
"Headquarters for Engineered Cutting Tools"

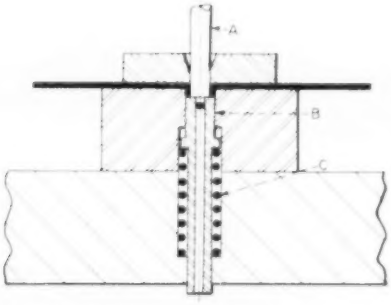
Choose Die Bushings Carefully...III



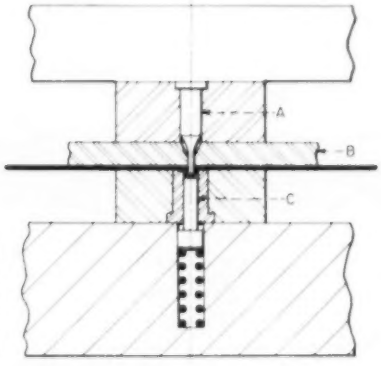
BALL-BEARING BUSHINGS. Richard Brother's standardized punches and die bushings are held in their retainers, and also kept from turning, by spring-backed steel balls. These bear in spherical seats, machined in the punches and die bushings. A simple tool pushes down the ball, depressing the spring, for removal of the bushing or punch for sharpening.

RETAINED BUSHINGS. Hovis standardized die bushings and piercing punches are held in their retainers, and also kept from turning, by special socket capscrews, the heads of which bear against grooves machined in the bushings and punches. The heads of the retaining screws have a flat so that it is only necessary to give them a quarter turn to remove the bushing, or punch, for sharpening or replacement.

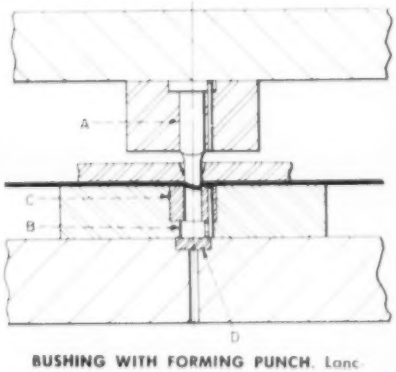




SPRING-SUPPORTED BUSHING. Both piercing and extruding of the hole can be done at the same station with the setup shown. A spring stripper plate first contacts the strip and holds it securely. Piercing punch *A* then pierces a hole in the strip, the slug entering die bushing *B*. Spring *C*, which backs up the bushing, must be strong enough to withstand the cutting pressure. Further descent of the press ram causes the large diameter of punch *A* to extrude the strip to the finished shape. When the ram goes up, bushing *B* acts as ejector and raises the extruded portion of the strip for movement to the next station.

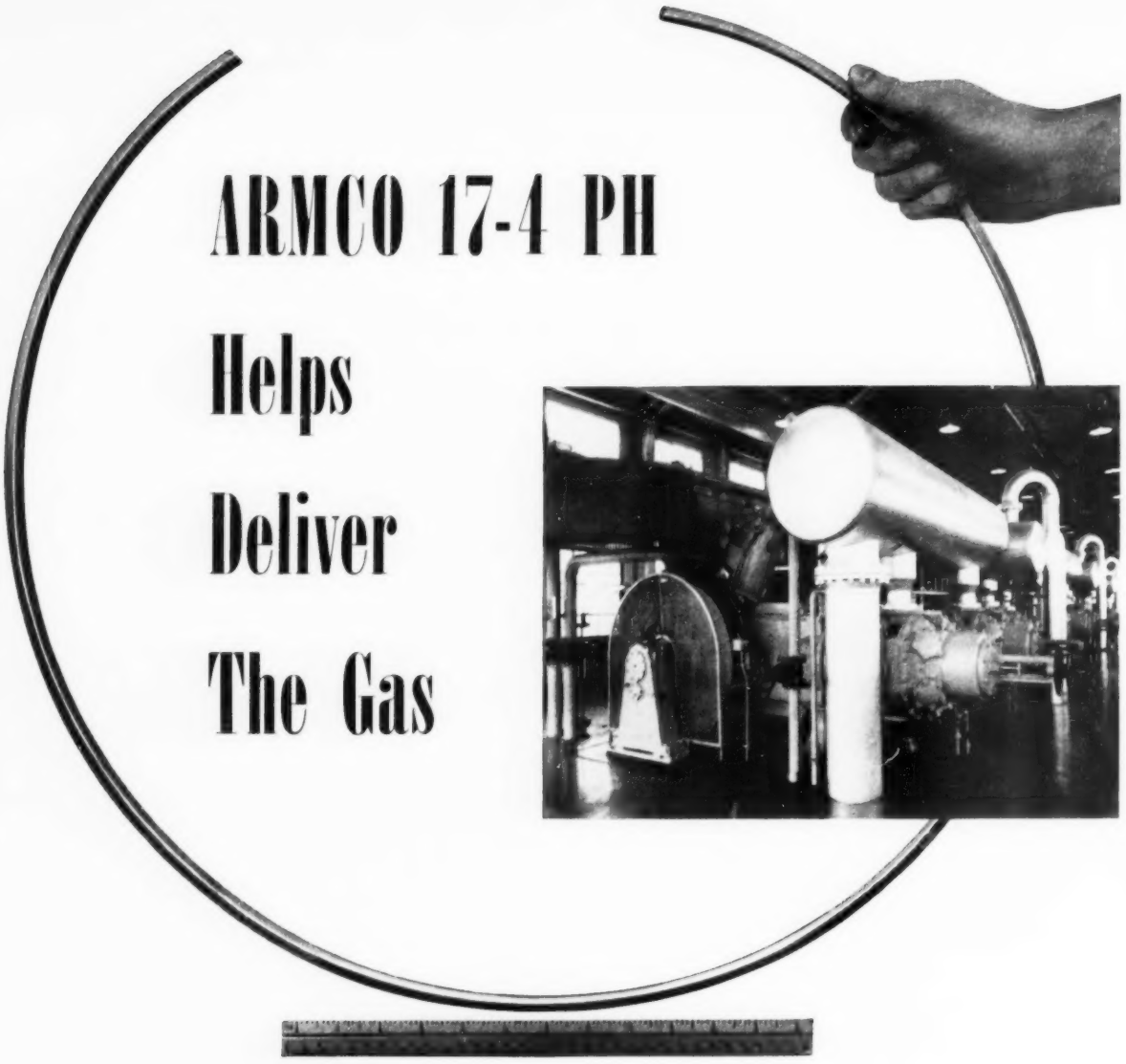


EXTRUDED HOLES. When holes in sheet-metal parts are to be subsequently tapped, they are often extruded, as shown, to provide more wall surface for the threads. This is accomplished by a cone-pointed extruding punch *A*. Spring stripper *B* first descends and securely holds the strip. Knockout pin *C* raises the extruded portion above the level of the die block for further movement of the strip.



BUSHING WITH FORMING PUNCH. Lancing, that is, partly cutting a tab and bending it down, is accomplished by this arrangement. Lancing punch *A*, secured against rotation by a dowel, descends and cuts the tab, in this case in the form of an elongated slot, with one end still part of the strip. Form punch *B*, applied within the die bushing *C*, acts jointly with the lancing punch to set the form of the lanced portion. A hardened pad *D* backs up the form punch. Bushing *C* is kept from turning by a dowel. The strip is raised for further movement by two spring-backed pins set at either side of the die bushing. These are not shown, as they would by applied front and back of the bushing, as seen from the operator's position.

ARMCO 17-4 PH Helps Deliver The Gas



This large hoop is a vital part of a large gas compressor. As a piston ring expander it must exert continuous pressure on the piston ring. The ring is made of Armco 17-4 PH, a new precipitation-hardening stainless steel.

HARDENED WITHOUT DISTORTION

Armco 17-4 PH requires only a single low-temperature heat treatment at 850-900 degrees F. There is no distortion, cracking or scaling—only a light heat tint. Yet the heat treatment develops a minimum tensile strength of 180,000 psi and minimum yield strength of 165,000 psi.

TWO PRECIPITATION-HARDENING GRADES

Armco 17-4 PH is produced in bars and wire. Another precipitation-hardening stainless steel, made in sheets, strip, plates, bars and wire, is known as Armco 17-7 PH. Depending upon condition, this grade is hardened by a single or double low-temperature heat treatment.

HIGH STRENGTH PLUS CORROSION RESISTANCE

Both precipitation-hardening stainless steels develop yield strengths higher than Types 301, 403, 410, 414, 416 and 431, with equal or higher tensile strengths. Yield strengths in compression are equal to or higher than those in tension. Corrosion resistance of both grades is generally better than that of the standard hardenable types.

If you want the latest information and test data on these remarkable stainless steel grades, write for the bulletin, "Armco Precipitation-Hardening Stainless Steels."

Armco Steel Corporation

3823 Curtis Street, Middletown, Ohio • Export: The Armco International Corporation

ARMCO

TALKING SHOP

Profit

THE ATMOSPHERE is beginning to clear somewhat, but there are still those who feel that to make a profit is somehow bad. To them, these two paragraphs may be helpful:

"Take, for instance, such a simple thing as a shovel. The manufacturer made a profit on it. The jobber made a profit, and so did the dealer. Yet, all the profits combined will not equal the profit to come to the man who buys it for use.

"The purchaser will use the shovel for years. In the spring, the shovel will dig up his garden. In the fall, it will line his flower beds. In the winter, it will get coal into his furnace and snow off his walks. This will go on for years and years. Isn't the profit of service to the man who buys this shovel greater than the profit of money to the man who makes it, or to the man who markets it?"

Too Close

WE HAVE MENTIONED periodically the difficulties developing from increasingly tight tolerances. Another one was mentioned at the recent AGMA meeting. Master gears for checking some present aircraft and military-instrument gears must be at least accurate to ±0.0001 in. But dial-indicator-type instruments are themselves only accurate to ±0.0001 in. Thus gearmakers are using electronic gaging units to increase accuracy.

Another problem becoming important is that concerning tooth spacing or tooth position. One speaker pointed out that these could be of three types: variation in tooth-to-tooth spacing (pitch error), total spacing error (variation between longest and shortest CP), and variation in true accumulated spacing. All three together are less, for example, than that created by weave in a hob, but become important in instrument gearing.

Frugal

LUKENS STEEL, through its By-Products Steel Co, is making components of leftover material right at the mill in Coatesville. A large stock of basic dies is provided to reduce the user's capital investment, yet enable Lukens to use up trimmed sections and the like. On a new hay baler, for example, investment for special dies was only 4% on annual sales of $990,000. In another case, $22,000 was saved on cost of a single part for a press brake.

This is another example of letting the specialist do the specialty. Readers may recall a similar plan in use by Sylvania at Wheeling, W Va. Clippings from the company's own output of fluorescent fixtures serve as base stock for automotive parts blanked for a Detroit company. That cuts costs for the Detroit people, uses Sylvania scrap, and means that the steel that ends up as scrap moves only across the Ohio River twice on short trips. Further, Sylvania can balance out press-shop loads and make extra equipment pay.

Goniometer

T H PROJECTOR and associates at the National Bureau of Standards have developed an unusually precise and versatile goniometer. Built originally to measure angles on the Bureau's own 100-ft light range, the unit has three axes of rotation instead of the conventional two. One is fixed to measure horizontal angles, the other two are variable to suit the immediate problem. Considerable versatility is required because of the wide variety of shapes and sizes of equipment to be checked. The two base measuring units are rotary tables like those used on machine tools, graduated to 0.1 and 0.05° respectively. The U-frame for vertical measurements is graduated to 0.01°. Construction is largely welded for rigidity, and counterweights are provided to balance out loads of test equipment and the like. Constant-torque drives also help to minimize backlash and torsion errors. Tests indicate errors are no greater than 0.03° in a 90° arc on rotary tables, and 0.02° in 1° max or 0.10° in 90° max on the vertical U-frame. "Goniometer," by the way, means angle measurer.

"Grinding" Cracks

IT HAS BECOME common to call all cracks that appear when heat-treated pieces are ground "grinding cracks." It's easy to go on from there to the assumption that grinding causes them. Actually, many result from surface distortion in machining. Machining at slow speeds may actually distort the metal surface for 0.006 to 0.012 in., causing grains to be lengthened and pulled parallel to the surface. Heat-treating may relieve this somewhat, but won't entirely. Then the ground surface spalls and cracks. The remedy is machining at optimum speed—lowest forces on the tool. That may mean dynamometer tests on critical parts and materials to put the speed where it should be, not where the operator thinks it belongs.

Changing Research

FOR MANY YEARS, the U S rather left basic research to Europe. Our job was to convert it, by production research, into processes and products for the millions. But now the European sources are drying up, so basic research must be undertaken here. Some companies do it themselves, but much is done by financing it at colleges and institutes.

An interesting sidelight is the boom in sales of captured German research reports. In a recent week, more than a thousand copies of these reports were mailed by the Library of Congress and the Commerce Department's Office of Technical Services. Items most in demand, at prices from 10 cents to $10 a copy, are reports on chemical, electronics, and metalworking data. Indications are that industry is beginning to dig deeper for new things to make and sell.

News of Metalworking

AIR FORCE PLANE QUOTA FOR '53 SET AT 8800

WASHINGTON — Aircraft industry's production quota for the Air Force this year is 8800 planes, totalling some 118 million airframe pounds, it was revealed during a recent hearing of the House Appropriations Committee on the fiscal 1954 defense budget. This represents a gain of 2107 planes and 30-million airframe pounds over 1952 aircraft production.

A monthly production rate of 450 planes must be maintained for the Air Force to maintain the current 143-wing program, according to Lt Gen Orval Cook, Deputy USAF Chief of Staff for Materiel, speaking at the hearing. But, he said, the fiscal 1954 budget can support production of only 325 planes a month by January 1956. And the Air Force would get only 200 of these a month.

However, General Cook said, this is being done deliberately so as to bring several new types of planes into production using fiscal 1955 funds.

The Air Force is scheduled to get 7350 planes in fiscal 1954, and 6000 planes in fiscal 1955—making a total of 13,350 planes for the Air Force alone, in addition to those scheduled for MDAP, the Army, Navy and Marines.

Services Already Battling for Lion's Share of Vance Plan Money

WASHINGTON—At press time, it looks as though the $500-million Vance Plan (standby production lines for defense) will be OK'd by the Senate along with the Defense Department's fiscal 1954 appropriation bill. The House has already voted its approval.

Services Map Projects

It has been disclosed that the military services have already mapped out projects they would like to have financed by Vance Plan funds. The $1.2-billion list submitted by the services includes these projects:

- **The Air Force** wants to stock up on vertical turret lathes, horizontal and vertical broaching machines, horizontal hydrotel and Keller machines, and radial drills of a size adequate to meet jet engine needs during the next five to 10 years. In a typical big jet engine plant, 300 of these tools, costing $10 million, would reduce time for achieving full-mobilization jet-engine output from 2½ years to one year, the Air Force says.
- **The Navy** wants about $3 million to buy 40 long lead-time tools to set up reserved production lines for a "new type" of bomb.
- **The Navy** wants $3.6 million to buy 24 tools for manufacturing new steam-actuated catapults.
- **The Navy** wants to complete tooling at its Lynn, Mass., marine reduction gear plant. Cost: $8 million.
- **The Navy** wants to boost tooling at its plant at Lester, Pa., where destroyer-type turbines and gears are manufactured. Cost: $1 million.
- **The Army** wants to build and equip a new plant to produce "double-base propellants" (explosives) at a cost of $60 million.
- **Increased foundry capacity** to produce heavy armor castings for tank hulls and turrets. This isn't actually a "reserve" project, because a deficit currently exists between foundry capacity and tank assembly capacity of about 700 hulls and turrets monthly.

Secretary of Defense Charles E Wilson says these types of projects will "receive careful consideration" under the Vance Plan. Mr Wilson has reportedly been opposed to the reserve tool program all along, as well as to the "broad mobilization base" concept.

Wilson Still Lukewarm

Some observers feel that Mr Wilson's enthusiasm for the reserve tool program is still lukewarm, to say the least, and that his support of the plan has been dictated by the White House. Testifying before the House Appropriations Subcommittee recently, he said:

"I am frank to tell you gentlemen that I do not know whether I will need all that money. I do not know exactly what machinery we will spend it for. I will tell you we are not going to spend any of it unless I am sure it is going to be spent properly—and I have hold of it in the Department of Defense where I can watch it a little better."

$4.1 Billion for Tools to Date

During Mr Wilson's testimony, it was further brought out that $4.1 billion have been appropriated to the military services since Korea for machine tools. As of April 30 of this year, $3.4 billion had been spent. The unobligated funds: Army, $345.3 million; Navy, $5.6 million; Air Force, $415.9 million.

JET ASSEMBLY LINE at Lockheed's Burbank, Calif. plant turns out F-94C Starfire jet interceptors. From here, the F-94C's are trucked to Lockheed's Van Nuys, Calif. plant for final assembly operations

Machine Tools to be Stored as Ordnance Cuts Sharply Into Tank and Military Vehicle Output

DETROIT — Gradual demobilization of plants making military hardware (tanks and military vehicles) has started, according to an announcement made here July 8 by Brig Gen Carroll H Dietrick, commander of the Detroit Automotive Center.

Plans are to drop production on many models and cut back production to a single plant in instances where two or more plants are making the same item. Meanwhile, machine tools from the demobilized plants will be stored and kept in repair in warehouses to be built by the Corps of Engineers adjacent to the closed plants.

General Dietrick's announcement confirms the recent across-the-board cutbacks in defense production ordered by Secretary of Defense Wilson and is also in line with Secretary Wilson's "narrow the production base" theory.

Current objectives of the cutback, as outlined by the Defense Department, are to eliminate multiple sources of certain items of military hardware and to concentrate the remaining orders in a single plant. Defense Department is asking contractors to submit bids on the limited quantities of items still to be produced. Low bidder will stay in production. Other bidders will shut down, the Defense Department says.

For example, three companies are making the Patton M-48 tank — Chrysler Corp at Newark, Del; General Motors at its Fisher Body Division, Grand Blanc, Mich; and Ford Motor Co at Livonia, Mich. Ford has already been declared out of the running under an earlier cutback, leaving Chrysler and GM to bid against each other. Both have been requested to submit bids not later than August 15. Losing bidder will go out of production next March, when he has had time to taper off output.

Production of M-47 tanks will be dropped altogether, with Chrysler's Detroit tank plant winding up production in November, and the other supplier, American Locomotive Co, Schenectady, doing the same next spring.

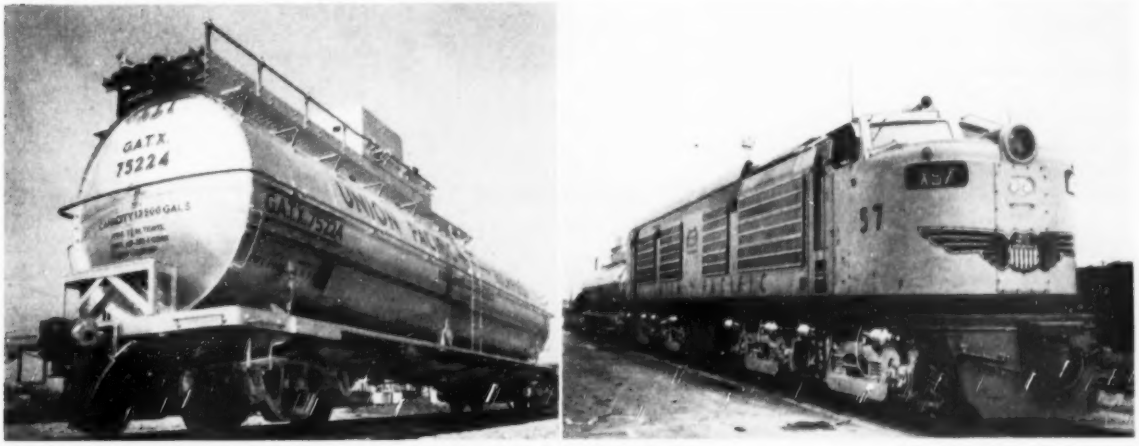
Production of the M-41 Walker Bulldog light tank is unaffected and will continue at GM Cadillac Division's Cleveland plant, which will also take over part of an order for anti-aircraft guns previously scheduled for production by American Car & Foundry Co. Reason: Many gun carriage and M-41 parts are interchangeable.

Two producers of air-cooled tank engines, the Chrysler-operated Michaud Ordnance plant, New Orleans, and Avco's Lycoming-Spencer Division plant at Williamsport, Pa., will be dropped, leaving the field to Continental Motors Corp's Muskegon, Mich, plant. Continental Motors designed and developed the engine.

Two producers of 2½-ton military trucks will be invited to bid against each other—GM's Truck and Coach Division, Pontiac, Mich, and Reo Motors, Inc, Lansing. High bidder will stop production next January. A third producer, Studebaker Corp, has already been phased out of the program, will end truck production in September.

The same procedure of competitive bidding will be followed on five-ton cargo trucks. Mack Trucks, Diamond T and International Harvester are now in production.

When a plant cancels out, Ordnance plans to store its machine tools in "production packages" (all tools necessary to do a specific job). According to Ordnance officials, keeping these packages intact is so important that tooling on order required to complete a package will not be cancelled. Example is the Michaud Tank plant, due to be phased out, where a large foundry now being built will be completed regardless of the the phaseout. All other tool orders still stand. Plants making replacement parts will continue operations, Ordnance says.



WORLD'S FIRST PROPANE-POWERED TURBO-ELECTRIC LOCOMOTIVE undergoes a trial run at Union Pacific shops. Claimed to be the world's most powerful locomotive of its size, the unit weighs nearly 276 tons and delivers upward of 4800 hp. In recent tests, the locomotive handled a 79-car train with ease. Propane fuel supply is carried in a special tender, whose outer shell covers a 4-in. layer of cork. Heat exchanger utilizes steam to increase pressure under which liquid propane is confined. Forced into the gas turbine, the propane is mixed with compressed air in the combustion chamber. Resulting blast strikes the turbine blades, which whirl at 6900 rpm. Turbine shaft, through reduction gears, drives four generators, powering eight traction motors.

Capital Goods Manufacturers Eye World Markets As Key to Healthy Industrial Economy

CHICAGO—US capital goods manufacturers are looking more and more toward foreign countries as an outlet for their products, particularly the so-called "less developed" nations, where a tremendous potential market exists for all types of American-made capital goods. This fact was brought out in a recent nationwide survey of capital goods producers undertaken by the Council for Technological Advancement.

In querying individual machinery manufacturers, CTA found that the export market pattern changes almost from day to day. But two major trends are apparent:

- Exports are dropping off from the 1952 peak, but by all other standards are still high.
- Latin America has taken over from Europe as the No. 1 market for export capital goods. But Canadian purchases have increased sharply in recent months and it may not be long before Canada becomes the chief consumer of US machinery.

The importance of world markets to American manufacturers is apparent in the fact that $3 billion worth of machinery and equipment was exported in 1952—20% of all US exports.

During the last few years, between 11 and 12% of all machinery and equipment sales have been to foreign consumers, while some capital goods manufacturers report an even higher proportion of sales to foreign markets. Tractor manufacturers, for instance, report that exports comprise 23% of their total business.

There are, of course, exceptions to the trend toward Latin American and Canadian markets and the expansion of markets in less-developed countries. Notable among these is the metalworking machinery industry, which still looks to highly-industrialized Europe as its principal foreign market. Metalworking machinery comprised some 10% of total US capital goods exports in 1952.

Machinery = 25% of Exports

Machinery and equipment exports in recent years have increased much more rapidly than total American exports. Just before World War II, capital goods accounted for about 15% of all exports. Today they comprise almost 25% of the total dollar value of nonmilitary exports. Increase in sales of some types of machinery, notably metalworking and electrical, is even greater, since overseas sale of some equipment cannot be reported for security reasons.

Total physical volume of machinery and equipment exports in 1952 was almost 3½ times as great as that for 1938 (table I), with exports of engines, turbines, construction and mining machinery achieving the largest increases. Projecting price increases since 1938, the 3½-fold expansion in physical volume becomes a sixfold increase in dollar value.

Exports Decline Since '52

Machinery exports are on a downward trend from 1952's record $3 billion. A comparison of first quarter 1953 with first quarter 1952 shows a 2.7% decline in capital goods exports, despite a 27% increase in overseas purchases of electrical machinery and apparatus. Non-elec-

table 1 .. MACHINERY EXPORTS BY PHYSICAL VOLUME (1938 = 100)

		Northern No. America	Latin America	Europe	Asia	Total All Areas
Agricultural (excl. tractors)	1952	712	181	359	510	343
	1951	555	253	295	774	347
Tractors and parts	1952	425	441	194	623	328
	1951	427	559	164	655	356
Other machinery (excl. electrical)	1952	675	531	218	180	329
	1951	573	523	191	125	288
Engines, Turbines	1952	650	492	363	431	496
	1951	708	518	523	1332	520
Construction, Mining	1952	729	309	382	157	323
	1951	614	288	294	104	244
Metalworking	1952	591	592	156	44	148
	1951	441	581	101	20	112
Electrical, Apparatus	1952	596	405	208	364	339
	1951	430	415	190	281	297
ALL MACHINERY	1952	608	446	216	225	332
	1951	508	464	190	169	301

table 2..MACHINERY EXPORTS 1951, 1952, FIRST QUARTER 1953

	MILLIONS OF DOLLARS		
	1951	1952	1st Qtr. 1953 (Annual Rate)
Electrical	556.1	687.3	809.6
Industrial	1337.3	1550.0	1534.0
Construction, Mining, Pumps	406.3	500.0	489.2
Metalworking	192.4	261.5	320.4
Textile, Shoe	144.1	107.4	87.6
Engines, Turbines	167.0	155.2	134.8
Office Machines	119.5	89.1	82.0
Printing	35.8	28.3	26.4
Agricultural	140.8	140.8	128.0
Tractors and parts	310.2	322.5	346.4
Railroad, Transit	67.3	79.7	66.0
Scientific Equipment	63.9	55.8	54.8
TOTAL ALL MACHINERY	2630.9	2953.5	3047.2

table 3 .. PERCENTAGE OF EXPORTS COMPARED TO ALL FACTORY SHIPMENTS

	%
Engines, Turbines	14.3
Mining, Pumping	15.8
Metalworking	19.3
Textile, Sewing	22.0
Agricultural	11.2
Printing	17.4
Tractors	22.8
Electrical	5.5
Railroad	4.2
Office machines	16.2
Instruments	4.1

table 4 .. PERCENTAGE OF MACHINERY EXPORTS BY AREAS

		Northern N. America	Latin America	Europe	Asia
Agricultural (excl. tractors)	1952	53.6	25.5	6.9	3.2
	1951	41.3	35.1	5.6	4.8
Tractors, parts	1952	36.6	26.8	11.7	10.4
	1951	33.7	31.2	9.1	6.5
Other machinery (excl. electrical)	1952	24.2	30.8	23.5	11.5
	1951	23.5	34.6	23.5	9.2
Engines, Turbines	1952	24.3	35.3	12.7	15.9
	1951	25.1	35.7	17.5	11.8
Construction, Mining	1952	23.3	29.6	14.2	11.1
	1951	25.9	36.5	13.2	9.7
Metalworking	1952	16.1	9.8	66.6	5.7
	1951	19.6	12.8	57.4	4.7
Electrical	1952	27.5	38.0	14.8	13.1
	1951	22.6	44.4	15.4	11.5
ALL MACHINERY	1952	28.0	31.7	19.3	10.9
	1951	25.7	36.4	18.7	9.0

trical capital goods exports dropped 9% during the period, with sharpest declines registered in office machines, scientific and professional equipment, and construction, mining and pumping machinery.

However, large gains were achieved by metalworking machinery, whose exports increased 26%. And capital goods as a whole dropped much less than total US non-military exports.

Table 3 shows the percentage of total shipments accounted for by exports. These figures are most important in the tractor and textile and sewing machinery fields, where they comprise almost 25% of total shipments. Some capital goods producers sell a larger percentage of their products overseas than the table indicates. For instance, CTA in surveying 248 Machinery and Allied Products Institute member companies, found that 33 firms did 15% foreign business, 11 firms did 25% or more.

Canada—a Growing Market

Fastest-growing market for US capital goods is Canada, which has come up rapidly since 1948 as a result of a major investment boom. In turn, this has caused a sharp upswing in demand for US machinery of all types. Leading the uptrend are agricultural, construction and mining machinery. As shown in Table 4, Canada has increased its imports of US machinery from about 15% in 1938 to 28% in 1952. Balance of trade in Canada's favor has much to do with the rise, i.e., price of Canadian raw material exports has risen faster than prices of imported US capital goods.

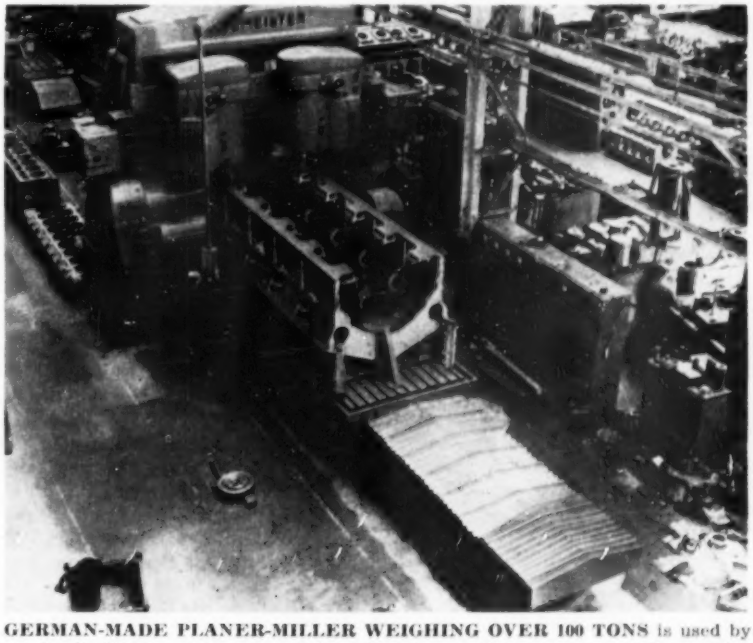
Latin America still retains first place as a capital goods export market, despite a lack of growth since 1948, accounting for 31.7 of all American exports.

Although Europe was the largest export market before World War II and its consumption of American capital goods has doubled since that time, Continental markets lag behind Latin America and Canada. European buying reached its peak in 1948 under stimulus of ECA financing. Since then, it has declined as a consumer. Exceptions to this are in the purchase of metalworking and electrical machinery and apparatus. European competition has aided in the decline, but the cutback in ECA financing has not affected Europe's markets as much as was originally anticipated.

Other world markets are declining in importance. Asia, Africa, Oceania and other "less developed" areas have dropped from 31.5% in 1938 to 21% in 1952, despite an increase in physical volume of purchases since 1948. On the other hand, sales of tractors, engines and turbines, and electrical machinery have risen sharply since prewar years.

Both government and US industry have a stake in the future of foreign trade. The reasons are threefold:

- Development of sources of industrial raw materials in nations of the Western Hemisphere through further mechanization of production is vital to US security and economic health.
- High-level export sales are necessary to healthy employment and profit conditions in US industry.
- Use of American-made equipment in foreign lands improves living conditions abroad, resulting in the expanded world trade vital to the health and security of the free world.



GERMAN-MADE PLANER-MILLER WEIGHING OVER 100 TONS is used by England's Mirrlees, Bickerton & Day, Ltd, to machine columns and backplates of 12-cylinder V engines. Machine table is 25-ft long, 6-ft wide. Four milling heads have 8¾-in. spindles powered by 35 hp motors. Speed range is 13 to 165 rpm. Cutters withdraw automatically at end of cut and are automatically reset to size for next workpiece. Cutters are equipped with backlash eliminators

CAPEHART INTRODUCES FIVE-YEAR WRITEOFF BILL

WASHINGTON — Fast amortization of plant and equipment received a shot in the arm recently when Sen Homer Capehart (R, Ind), chairman of the Senate Banking Committee, introduced a bill which would let companies write off in five years any capital equipment acquired after December 31, 1953.

Since Korea, many such facilities have been allowed five-year amortization. But only after they were certified as essential to defense production.

The new legislation proposed by Sen Capehart is intended as an ace-in-the-hole against any possible slide in business generally. He contends that his bill would help continue modernization and expansion of US production facilities and would also spur the building of new rental housing.

Chances for passage of the Capehart Bill this year are slim. It will first be considered by the House Ways and Means Committee—and is scheduled for discussion as part of that committee's review of the entire tax structure.

WESTINGHOUSE-ROLLS ROYCE TO TRADE TECHNOLOGY

Westinghouse Electric Corp and Rolls-Royce, Ltd, of England have signed an agreement providing for technical cooperation between the two companies for 10 years. The agreement includes exchange of information on the design, development and production of gas turbine aeroengines.

Unions Sign Agreement

AFL's International Association of Machinists and CIO's United Automobile, Aircraft and Agricultural Implement Workers of America have signed an agreement to (1) avoid controversy in the organizational field, (2) to strengthen cooperative relationship, and (3) to "insure maximum strength at the collective bargaining table."

Durkin to Speak

Principal speaker at the First North American Conference on Apprenticeship, to be held in San Diego August 2-9, will be Secretary of Labor Martin P Durkin. Some 2500 management, labor and government leaders will participate in the week-long Apprentice Conference sessions.

Flemming Sees Little Chance Of Expanding US Mobilization Base

WASHINGTON—The Office of Defense Mobilization and other government agencies are taking a new look at the "mobilization base"—the nation's industrial potential for war production, Mobilization Director Arthur S Flemming announced recently. Mr Flemming inferred that further industrial expansion will be pushed by the government only after pros and cons are studied thoroughly.

Little Expansion Seen

Even then, the Eisenhower mobilization program may only provide "plans" for an industrial expansion program. In only one area—that of providing "long lead-time difficult-to-produce and critical types" of tools and equipment—does Mr Flemming see any likelihood of further expansion.

Six Study Objectives

ODM's current study of the mobilization base is apparently the same as the one started last year by Flemming's predecessor, ex-Mobilization Boss Henry H Fowler. Its objectives are to establish the following points:

- US industry's production potential in the event of all-out war, plus assistance that can be expected from our Allies.
- Rock-bottom civilian requirements.
- The share of industrial production that could be devoted to military output in the event of war.
- Ability of basic industries to supply the tools, materials and components required for all-out war production.
- Deficiencies now existing in industrial production for war.
- The level of exports necessary to support allied nations.

Gaps in the mobilization base revealed by this study will have to be filled in, Mr Flemming said. But, he added, the filling-in will be undertaken on "a highly selective basis."

Republic Steel to Produce 50,000 Lb Of Powdered Iron Per Day at Toledo

CLEVELAND—First major US steel producer to enter the fast-growing powdered metals field, Republic Steel Corp of this city has announced it will build a plant at Toledo for the commercial production of powdered iron, utilizing an entirely new, patented process.

Republic, which hopes to achieve 50,000-lb daily production, will thus become a major factor in US powdered metal output. About 100 firms are currently using iron powder in the manufacture of gears and other precision parts. In gear manufacture, powder is pressed between dies, then heated to a point where the iron particles weld themselves into an integral mass that requires no subsequent machining. The result: rapid, economical mass production.

In addition to serving this field, Republic intends to provide iron powder for use in flame scarfing and cutting, where the powder intensifies the flame's heat.

Also under consideration by Republic: production of sponge iron (by a variation of its powdered iron process) for use in making tool and other high-grade steels; and production of nickel and manganese from low-grade ores.

Republic officials are keeping mum on details of the iron powder process until patents rights are cleared. But the effectiveness of the product has been attested to by seven of the country's largest consumers of powdered iron. Without exception their verdict was "excellent quality."

Republic will use ore from its Adirondack mining operations and from its Liberia (Africa) Mining Co. Location of the plant in Toledo will enable Republic to buy hydrogen necessary to the process from its next-door neighbor, Sun Oil Co, which produces the gas as a by-product of its cracking operations.

Another advantage of the Toledo location: proximity to Detroit and Western Ohio automotive centers. Auto manufacturers are the No. 1 users of iron powder to date.

Expected to be in operation sometime next summer, the plant will probably employ fewer than 100 men because of its highly-automatic and continuous operations.

FEATURE OF HEPPENSTALL CO'S RECENT OPEN HOUSE was this 33,000-lb steel shaft. Two open hearth furnaces were tapped simultaneously to produce the original 103,000-lb ingot. Forging reduced ingot's weight to 73,000 lb. and machining to exact shape and weight brought shaft down to final weight of 33,000 lb

"No Space, No Tool" Policy May Mean Another Cut in AF Heavy Press Program

WASHINGTON—Another big cut in the Air Force's controversial Heavy Press Program may be in the offing. Last month's cancellation of contracts with four producers for seven giant forging and extrusion presses leaves only 10 machines now on order (*AM*, July 6, p170). Now there's a real chance that four more of the huge presses may be cancelled out of the program.

Assistant Air Force Secretary Roger Lewis recently told aircraft parts manufacturers who have heavy presses on order that they will have to house the huge tools in existing facilities or build new plants without Air Force funds. It's doubtful that the manufacturers will be willing to do this. Thus the prospect is that tools requiring added plant facilities will be eliminated.

Four Presses Involved

Presumably, the new policy wouldn't affect work already well in place. But the new "no space, no tool" policy would hit Harvey Machine Co, Torrance, Calif; Kaiser Aluminum & Chemical Co, Halethorpe, Md; and Reynolds Metals Co, Phoenix, Ariz.

The three companies each have 8000-ton extrusion presses, costing $3.4-million each, on order with Lozewy Construction Co, New York. It is also understood that Reynolds would halt construction of a 12,000-ton press, costing $4.6 million and on order with the Lombard Corp, Youngstown, Ohio, if required to build its own plant.

Originally, the Heavy Press Program called for 17 presses to be built by eight companies. These were to be installed at six aircraft parts manufacturers' plants. Total cost of the program was estimated at about $100 million for tools and upwards to $170 million for facilities to house the presses.

Last month's cutback pulled the program down to 10 presses, valued at $54.5 million. Estimated plant construction outlays dropped to about $90 million.

Would Leave 6 Out of 17

The new cutback of four presses would result in completion of only six presses, valued at about $40 million, with no government funds available to finance construction of facilities to house them.

Metalworking Abroad

(McGraw-Hill World News)

AUSTRALIA — Scientists here are studying possible use of coal-burning turbo-jet locomotives for the Victorian State Railways. Chief obstacle: eliminating the deposit of ash left in the turbine. All-metal combustor, now under test, shows promise of overcoming the ash problem.

BRAZIL — National Association of Machinery, Vehicles, Accessories and Parts is compiling a budget covering minimum import requirements for aircraft and automotive products, earthmoving and mining machinery, agricultural machinery and industrial machinery.

SWITZERLAND — Incoming orders for Swiss machinery have dropped in recent months. Backlogs are down from nine months to seven months since last year.

GERMANY—Heinkel, Messerschmidt and Dornier, top German aviation firms, have banded together in an informal cartel in preparation for resumption of aircraft production as soon as Allied restrictions are lifted. German aircraft manufacturers feel that once they get going, it won't be long before they can compete successfully with US and British plane makers. One reason: US aircraft workers get $2 or better an hour—Germany's prevailing wage rate is 46¢ an hour. It will take just one year from the time the Allies give the go-ahead signal until the first plane rolls off the line, German planemakers say.

UNITED KINGDOM — British Railways will shortly launch a large-scale rolling stock building program, including manufacture of 288 locomotives, 1448 carriages and 42,641 wagons. Most of the rolling stock is needed for replacement.

JAPAN — The International Trade & Industry Ministry is establishing heavy machinery consultants' offices in India, Pakistan, Thailand, Burma, Brazil and Argentina. Purpose is to promote Japanese export of machine tools and equipment.

RUSSIA — Soviet textile industry's new spinning machinery still has plenty of bugs in it. Among the faults listed by Russia's official newspaper *Izvestia*: they're "awkward to use"; some need simplification; others should be more reliable; and faulty metallurgical components often result in poor parts fit.

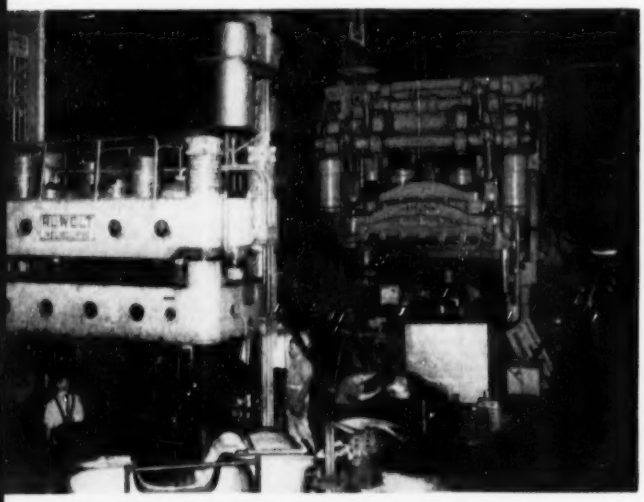
General Motors-Holden—"Little Detroit"

MELBOURNE, AUSTRALIA — US automotive techniques are paying off at General Motors-Holden's Ltd, Australian consolidation of GM's overseas operations and the long-established Adelaide firm of Holden's Motor Body Builders. GM-Holden's manufactures the Holden, a roomy, short-wheelbased car particularly suited to Australia's rugged and varied terrain, which ranges from tropical jungles to vast deserts.

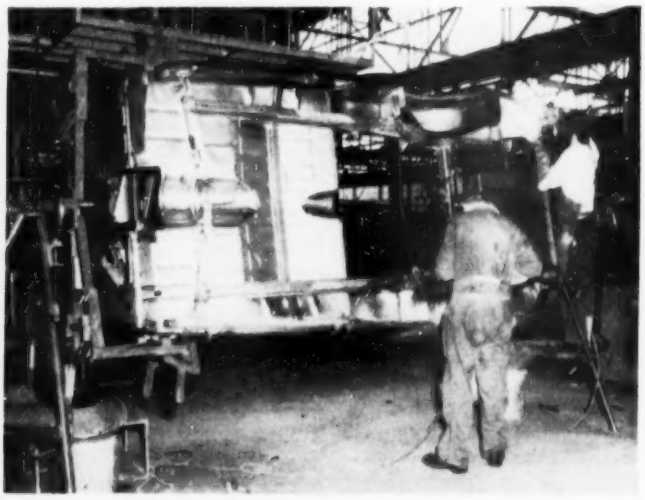
Although the Holden is American designed and US mass-production techniques are very much in evidence at GM-Holden's, the firm is Australian-managed and staffed, and tooling is now almost completely local. All major castings and forgings are made at the company's Fishermen's Bend plant, Victoria, N S W, and bodies and pressed metal parts are made at GM-H's Woodville, South Australia, plant.

Processing methods at both plants are highly similar to those used in US General Motors plants. Majority of machine tools in the four-year-old plants are American built, with some British and Swiss equipment. Of late, more and more new production-line installations are Australian-built.

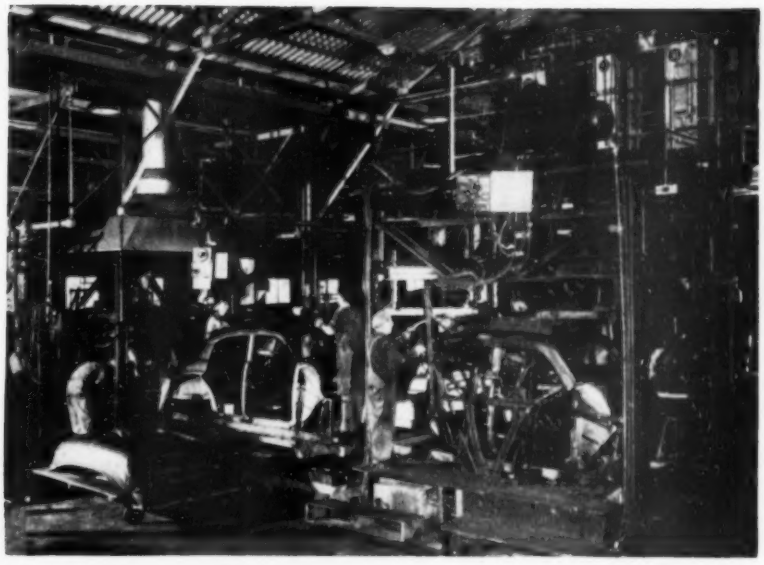
Shown here are some of the highly mechanized operations at GM-Holden's auto-body plant at Woodville. Here, modern production-line techniques, from heavy press to final paint job, are employed in producing integral bodies and frames, which cut car weight to 2230 lb, yet permit roomy, comfortable seating of 5 or 6 passengers.



PART OF FENDER AND HOOD LINES at Woodville. Press at left is Australian, one at right is American



WELDING THE UNDERBODY. Chassis is set on trunnion fixture. Latest welding techniques create strong, integral



Down Under

(ABOVE, LEFT) Spot-welding center pillar on body shell. Unit is supported by a counterbalanced yoke

(ABOVE, RIGHT) Two of the Woodville plant's main assembly fixtures. Roof-seam fixture is at right

(RIGHT) Final welds are made with the torch. Gas and oxygen are manifolded from above

(FAR RIGHT) Final welding and body-shell assembly section. Bodies are on carriers rather than on conveyor

HAND SPRAYING interior, door rails and instrument panel before upholstery is applied. At this stage of the operation, automobile body is still on the carrier, which is now advanced by an underfloor drag chain

Business Items

Bryant Machinery & Engineering Co has moved its offices to 640 W Washington Blvd, Chicago.

Butcher & Hart Mfg Co, Toledo manufacturer of machine screws and other products, is moving to larger quarters in Altoona, Pa.

Preferred Bearing Co, Bristol, Conn, has been purchased by Walter P Jacob, president of the Hartford Electric Steel Corp, and will henceforth be known as the **Bristol Bearing Co.**

Indianapolis Machinery & Supply Co has opened a new and used machine tool showroom at 186 Grand St, New York City. Both domestic and foreign tools will be displayed under power at the showroom.

Worcester Pressed Steel Co, Worcester, Mass., has acquired **Hi-Pac Corp,** Hillside, N J, makers of small gas-pressure cylinders. Hi-Pac's facilities will be transported to Worcester in a few weeks.

Universal American Corp, New York, has purchased a controlling interest in **Norma-Hoffman Bearings Corp,** Stamford, Conn, ending the firm's 30 years of British control. Norma-Hoffman will continue to operate as a separate company. Officer personnel is unchanged except for election of Attorney Herbert M Singer as board chairman, and Leonard Morey, president of Morey Machinery Co, as a member of the board.

DeVilbiss Mfg Co, Ltd, Canadian subsidiary of the **DeVilbiss Co,** will shift its manufacturing operations from Windsor, Ont, to a new $600,000 plant at Barrie, Ont, on or about December 1.

Link-Belt Limited held an open house at the opening of its new 72,000-sq-ft conveying and processing equipment manufacturing plant at Scarboro, Ont, June 29. The plant also houses the Canadian company's offices.

Conant Tool & Engineering Co, Chicago, has changed its name to **Conant Broach Co.**

White Motor Co, Cleveland, has acquired **Autocar Co,** Ardmore, Pa., producer of heavy-duty trucks, as part of its expansion program.

ASA Drafts ABC Limits and Fits System

NEW YORK—A proposed system of limits and fits has been drafted by the American Standards Association. The ABC System was unanimously approved by delegations from the US, United Kingdom and Canada in February. Recently, it was published in ASA's magazine, *Standardization*.

Groundwork for the ABC System was laid in 1925, when ASA approved a Tentative American Standard on Tolerances and Gages for Metal Fits, containing tables for eight classes of recommended fits. This standard was partially revised in 1947, but the revision does not contain tables of fits. It was then indicated that this information would be contained in a second part still to be developed.

Before work goes ahead on the second portion, US industry will be canvassed on two questions (1) does industry want American standard tables of recommended fits, and (2) if so, should such tables be based on the ABC proposal?

Copies of "Draft Proposal for an ABC System of Limits and Fits" are available from American Standards Association, 70 E 45th St, New York 17, at 75¢ a copy. Reprints of the article "Does Industry Want American Standard Tables of Recommended Fits?" (*Standardization*, May 1953) are available at 25¢.

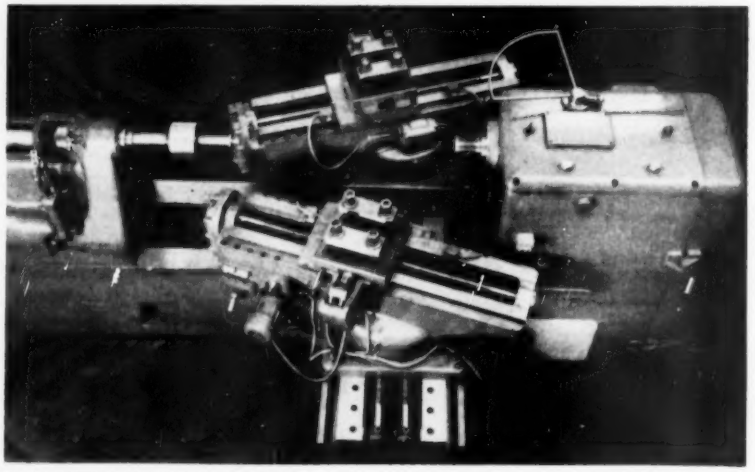
High-Pressure, Completely-Automatic Spinning Lathe Developed In Sweden

SKEDE, SWEDEN—New, completely automatic spinning lathe, designed for working hard alloys and stainless steel, has been been developed here. Pressures are claimed to be so high that cold flow takes place, and metal is not only shaped to the chuck, but its thickness can be varied to any desired amount.

Machine is equipped with either one or two cross-slides. In the latter case, two tools can operate simultaneously.

Main spindle motor is 25-hp, and each cross-slide has an independent ¾-hp motor. Spindle speeds are steplessly adjustable in one range up to 225 rpm, in the second range up to 920 rpm. Cross-slide feeds are 5, 6, 7, 8½, and 10 ipm, with 61 ipm return. Compounds carrying the tools are operated by air cylinders through toggle joints. All operations are push-button-controlled for individual performance, or the full cycle can be operated from a single button.

As an example of the work performed on this machine, 18-8 stainless steel buckets, 3.5-gal capacity, 12½-in. high, were made from a blank 0.10-in. thick. The button and the rolled edge of the finished piece remained 0.10-in. thick, but the sides were reduced to 0.016 in. Spinning time was 75 sec per piece at a feed of 10 ipm. Production time was 30 per hr. Machine is manufactured by Hallarydsverken, Skede, Sweden.



SWEDISH SPINNING LATHE is completely automatic, can shape hard alloys and stainless to the chuck and vary thickness to any desired amount

GM TO PUBLISH COLLEGE TECHNICAL JOURNAL

NEW YORK — General Motors Corp has just published the first issue of a bi-monthly technical magazine to keep educators and engineering college students advised of its latest technical developments. The new publication, titled the *GM Engineering Journal*, is edited by Arvid F Jouppi, formerly of Sperry Gyroscope Co and the Associated Press's Detroit Bureau.

The *Journal* is the outgrowth of talks between GM engineering officials and engineering college educators, who feel that such a publication would be invaluable as an aid to keeping students informed on current research, production and product engineering developments.

Contents will include signed articles by GM engineers in virtually every field of engineering—electrical, chemical, mechanical, etc — and by scientists developing new products and processes for industry. Articles will primarily be beamed at the junior, senior and graduate levels.

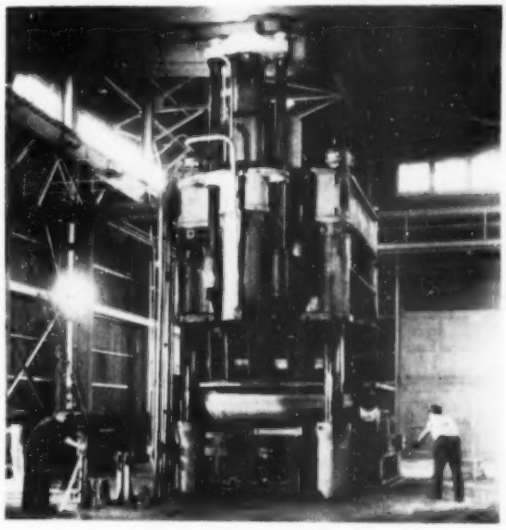
PMI TO SET UP TECHNICAL DEPARTMENT

HARTVILLE, OHIO—Establishment of a technical and engineering department for the Pressed Metal Institute was approved here recently during a three-day executive session of the Institute's board. The department will begin to function as soon as a qualified engineer has been named to head it.

Part of a long-range member-service expansion program, establishment of the department was given final impetus by a survey conducted in the industry by Armour Research Foundation. The survey showed that technical programs are considered PMI's most valuable service and that the department would receive 100% member support.

The new department will study technical trends having a far-reaching effect on the pressed metal industry; will provide liaison with other technical committees and government; advise of technical advances in competing industries; publish a monthly technical bulletin; and cooperate with engineering colleges.

Original research, to be undertaken as part of the program in the future, will cover literature searches, and the problems of metal flow, wrinkling, spring back, and die design as it affects the flow of metal.



LARGEST? Claimed to be the largest heads ever pressed are pear-shaped "watch case" circuit-breaker tanks of ½-in. steel like the one shown here being pressed at Lukens Steel Co's Coatesville, Pa., plant

Establish National Dynamic Equipment Policy Center at Illinois Tech this Fall

CHICAGO — Nationwide interest in education and research into methods of industrial equipment acquisition and replacement will focus on Chicago this fall with the opening of the National Center of Education and Research in Dynamic Equipment Policy at the Illinois Institute of Technology.

Plans for the center were recently announced by William J Kelly and Dr John T Rettaliata, presidents of the two sponsoring organizations, the Machinery and Allied Products Institute and Illinois Institute of Technology, respectively. The former will finance the center in its early years.

The center will have two basic objectives: (1) wide dissemination of information on enlightened equipment policy, and (2) sustained study of improved techniques and analysis of problems and practices in the field.

A program to implement these objectives will include:

- Day and evening lecture courses.
- Summer seminars for executives.
- Establishment of graduate fellowships, the recipients to specialize in Dynamic Equipment Policy.
- National awards for the best essays on the subject.
- Staff-student research.
- Establishment of a research library.
- Appointment of a director to head the center, in the near future.
- Appointment of an advisory committee by MAPI to work with the director and with Illinois Tech in executing the program.

In a statement of the center's objectives, MAPI and IIT officials said, "A scientific approach to the acquisition of new equipment and replacement of worn-out equipment is of prime importance to the success of every business enterprise . . . it is also basic to continued industrial leadership of the United States, and is inextricably bound into our national security.

"Thus, a better understanding of equipment policy at one and the same time serves private enterprise and fulfils a compelling public interest."

SPEAKS AT BRITISH DROP FORGERS MEETING

PERTHSHIRE, SCOTLAND—A new US forging hammer development attracted widespread technical interest here when it was described in a talk by Eugene C Clarke, president, Chambersburg Engineering Co, Chambersburg, Pa., at the annual meeting of the Drop Forgers and Stampers of England.

With the aid of a film, "Drop Forging in Mid-Air," Mr Clarke showed how his firm's new forging hammer, the Impacter, automatically forges knife handles, and turbine blades. Mr Clarke's talk was given wide publicity in Britain.

Charles M Pond

Hubert D Tanner

C R Olsen

M M Millette

Names in the News

Charles M Pond and **Hubert D Tanner,** both vice presidents and directors of Pratt & Whitney, Division Niles-Bement-Pond Co, retired on July 1. Mr Pond started with Pratt & Whitney in 1903 as an apprentice, subsequently becoming sales manager of the Small Tools Division, Manager of the Small Tools Department, and manager of the combined Small Tools and Gage departments in 1928. He was elected a vice president and director in 1939. Mr Pond has for several years been active in tool and gage standards work. Mr Tanner, who came to Pratt & Whitney in 1920 from Brown & Sharpe as a machine designer, was named manager of the Machinery department in 1935, and a vice president and director in 1939. Vice President **Richard W Banfield** succeeds Mr Pond as manager of the Small Tool and Gage Division. Other Pratt & Whitney promotions include: **Edward N Clark,** to superintendent, Small Tool Division; **Harold G Lucas,** to superintendent, Gage Division; **William R Back,** to superintendent, Aircraft Parts Manufacture; **Albert L Knapp,** to general superintendent, Machinery Division; **Edward J Ferris,** to assistant general superintendent, Machinery Division; **Edward J Shages,** to manufacturing superintendent, Machinery Division; and **Sandford G Etherington, Jr,** to supervisor of planning.

J Allan Greenland has been named San Francisco sales manager, and **Donald T Bixby** Seattle sales manager, De Laval Pacific Turbine Co.

Edwin W Shipman has been elected vice president and manager of Illinois Tool Work's Licensee Division. He joined Illinois in 1928.

Canute R Olsen has been appointed manager of the general sales staff of United States Steel Supply Division, U S Steel Corp, succeeding **Harold A Miller,** resigned. Mr Olsen has been acting general sales staff manager since May 1.

John F Haller has been named vice president in charge of engineering of Allied Products Corp, and **Eugene F Wambold** appointed vice president and general manager of Michigan Powdered Metal Products Co, an Allied subsidiary. Mr Haller, who founded Michigan and headed the company until it was acquired by Allied in 1951, will continue to direct its developmental work. Mr Wambold was formerly vice president in charge of manufacturing of General Electric's Carboloy Department.

Frank W Richard, formerly general superintendent in charge of production for Chrysler Corp's Tank Engine Plant, New Orleans, has been named to the newly created post of director of manufacturing services of Borg-Warner Corp, Chicago.

S Leonard Schwartz has been named superintendent of DeLaval Steam Turbine Co's North Plant, Trenton, N J. Navy veteran Schwartz joined De Laval as a project engineer in 1946, and was named assistant superintendent of shop operations in 1951.

Robert G Chelton has been appointed sales manager of Alkon Products Corp, New York. He was formerly with Supreme Products Co, Chicago, and Cleveland Twist Drill Co, Cleveland.

M Milo Millette has been appointed works manager at American Car & Foundry Co's Buffalo plant. Formerly general superintendent of the plant, and acting works manager since February, Mr Millette will be in charge of all engineering and production for Department of Defense and other government contracts, in addition to regular industrial work.

Lewis K Sillcox, vice chairman of the board, New York Air Brake Co, has been nominated for 1954 president of the American Society of Mechanical Engineers. Nominated for regional vice presidents are **Willis F Thompson,** vice president, Westcott & Mapes; **William G McLean,** Department of Mechanics, Lafayette College; **Thompson Chandler,** chemical engineer, Carbide & Carbon Chemical Corp; and **Clifford H Shumaker,** director of the Institute of Management, Southern Methodist University. Nominated for directors-at-large are **Frank L Bradley,** plant engineer, Forstmann Woolen Co; and **Robert B Lea,** Sperry Corp.

Charles A Gutenkunst, Jr, president Milwaukee Gray Iron & Malleable Works, was awarded the Malleable Founders' Society's 1953 McCrea Award for "outstanding service to the malleable iron castings industry" at the Society's Annual Meeting, June 8.

Clayton S Parsons, formerly New England and New York State manager for J K Smit & Sons, Inc, has formed his own company for the manufacture and sale of industrial diamond tools, wheels and abrasives, Parsons Diamond Products, Inc, 968 Farmington Ave, West Hartford, Conn. Mr Parsons will head the firm as president and treasurer. Another J K Smit & Sons alumnus, **Rockwell B Ward** is vice president.

Byron Coon

G H Madeska

W H Redpath

G E Rockwell

Byron Coon of Oakland, Calif, will head Rockwell Mfg Co's Delta Power Tool Division's new regional distribution setup in the West. Other regional managers named are: **George H Madeska** of Chicago, Central Division; **Walter H Redpath** of Toronto, Canadian Division; and **George E Rockwell** of New York, Eastern Division.

Russell V Anderson has been elected vice president and general manager of Plastic Metal Manufacturing Co, Chicago, and treasurer of Chicago Impression Die & Mfg Co.

William C Jordan, former president of Curtiss-Wright Corp, has joined Hiller Helicopters as executive vice president and general manager. A graduate of the US Naval Academy, Mr Jordan has been in the aircraft business since 1924.

George R Kinney, former Chief of the Forge and Press Section, National Production Authority, has been appointed executive assistant for J L Osgood Machinery & Tool Co, Buffalo.

A W Morgan, Plant 1 works manager for Consolidated Vultee Aircraft Corp, has been named general manufacturing manager at Convair's San Diego plant, where he will have direct authority over Plants 1 and 2. **W L Young** is serving as acting works manager of Plant 1.

Francis B Herlihy, formerly assistant chief metallurgist, has been appointed chief metallurgist of American Brake Shoe Co and will be located at the company's laboratories in Mahwah, N J.

Kenneth V Lutz has been appointed general field manager of All-State Welding Alloys Co. Since joining the company in 1948, and until recently, Mr Lutz has been regional manager for eleven western states and Hawaii.

Roy Rumbaugh, for eight years manufacturer's agent for Klem Chemicals, Inc, Dearborn, Mich, has been appointed director of sales engineering. He was previously 17 years with Ford Motor Co.

R B Nichols, president and general manager of the Bantam Bearings Division of The Torrington Co, has been elected president of the Anti-Friction Bearing Manufacturers' Association.

Donald L Millham, formerly comptroller of General Electric Co, has been elected a vice president of G-E and named general manager of its Lamp Division, Nela Park, Cleveland.

Phillip R Heim has been named vice president in charge of manufacturing of Vard, Inc, and made a member of the board of directors. Mr Heim moves up from his post as works manager, which he has held for the past year.

Edward D Rollins has been appointed Western manager of General American Transportation Corp's new Plate & Welding Division sales office in San Francisco. Mr Rollins has served with General American's Chicago office for eight years.

Wilbur Theiss has been named sales engineer for G S Blakeslee & Co's line of degreasing machines and alkali washers in southern Ohio, and portions of Kentucky and West Virginia. **Henry Kashman** has been appointed to a similar position in the New York City-Long Island territory.

H B Sallada has been named assistant general manager of United Aircraft Corp's Chance Vought Aircraft Division. A retired Navy admiral, Mr Sallada joined Chance Vought last August as executive assistant to the division's general manager. He was formerly Chicago plant manager for Fairchild Aircraft.

J H Horton has rejoined Niagara Machine & Tool Works' Philadelphia district sales staff after serving in the Armed Forces.

OBITUARIES

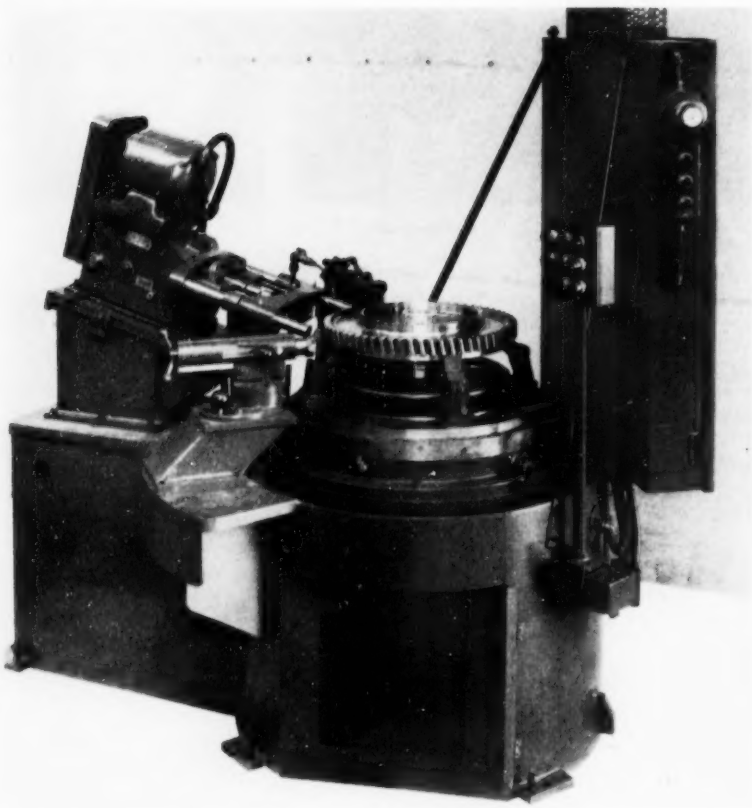
John L McLaughlin, 55, manager of Carrier Corp's unitary equipment plant at Syracuse, N Y, was fatally injured in an automobile accident near Amiens, France, while on a combined business and vacation trip with Mrs McLaughlin. He started with Carrier in 1932 as a draftsman at New Brunswick, N J.

Fred Comstock Boyce, 84, chairman of the board of directors of D J Murray Mfg Co, Wausau, Wis, died June 28 in Milwaukee, following a stroke on June 21. Mr Boyce retired as president of the company in April to become chairman of the board.

Russell S Springer, 73, retired factory manager for Holt Manufacturing Co, predecessor of Caterpillar Tractor Co, died in San Francisco July 1.

Dr Pierre I Chandeysson, 77, founder and president of Chardeysson, Electric Co, St Louis, died in that city June 5. A native of France, he came to America at the age of 17 and graduated from Washington University's College of Medicine eight years later. It was while at the University that Dr Chandeysson designed electroplating generators. Shortly after graduation, he formed the Chandeysson Electric Co.

New Shop Equipment



Avey Drilling and Tapping Machine Features Electrical Indexing Table

Avey Electrodex index-table machine, designed primarily for jet-engine drilling and tapping, is supplied with locator for original hole and checker for use with automatic operation. In event of trouble, checking device rings alarm and shuts down machine. Drillhead is Avey cam-feed unit or Aveydraulic unit. Precision leadscrew can be incorporated for tapping operations.

Index-table drive is supplied through pinion and gear from dc motor which is slowed by dynamic braking actuated by limit switch. As table stops, precision switch reverses drive to index the table accurately.

Features of the Electrodex index table include a non-accumulative tolerance of 0.001 in. max between adjacent holes at a dia of 30 in. and provision for varying the number of indexes produced by the table. The latter is accomplished by interchanging templets made on a jig borer.

By manual or automatic means, two or more series of indexes, varying in number of holes, may be produced in the work without disturbing location of part. Irregular series of holes may be indexed as easily as a regularly spaced series. Normal wear of driving pinion and gear has no effect on accuracy of indexed position.

Table is supplied with standard 30-, 36-, or 40-in.-dia table top. Work-holding fixture may be attached directly to this stress-relieved gray-iron casting or to a steel subplate which is then attached to table top.

Standard index range is from 2 to 100 stations. Irregular indexes of any spacing are permissible provided minimum spacing of 3.6" is maintained between stations. Closer spacing can be obtained with two templets and two revolutions of the table.

Standard electrical equipment is used throughout and is in accordance with JIC standards.

The Avey Drilling Machine Co, Inc, Cincinnati 1, Ohio

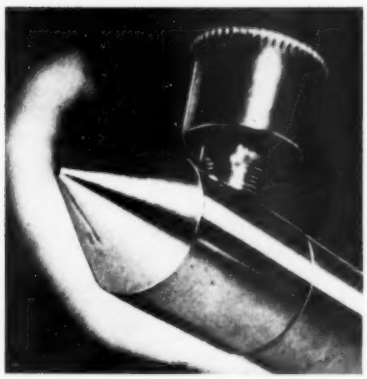
Non-Sulfur Cutting Oil

Magnus DO-2A, all-purpose non-sulfur oil, is suitable for copper, copper alloys, and tough alloy steels on both machining and drawing.

Several tests have been made. In one plant, prevented by specifications from using sulfur-based oils on 47% nickel steel, DO-2A reportedly outperformed the best grades of sulfur-based oils and resulted in improved surface finish.

It is said that die life has been doubled and seizures eliminated.

Magnus Chemical Co, Inc, South Ave, Garwood, NJ



Lathe, Grinding-Machine Center Has Forced Internal Lubrication

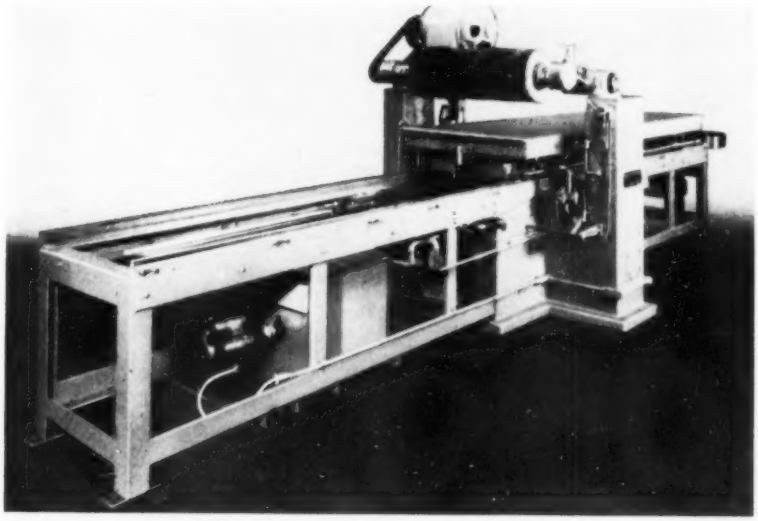
Oil-jet centers store lubricant in the grease cup and supply it to the work through a tiny jet in the center point. (Dia, 0.040 in.) The grease cup can easily be replaced by a grease-gun fitting, if necessary.

Center 60° points are tipped over the full length with HSS or a cast alloy claimed to outlast HSS five times or more.

Oil-jet centers are made mainly in Morse and B&S tapers; other tapers and straight shanks made to order.

Tool Service, PO Box 10265, Palma Ceia, Tampa 9, Fla

Materials and Parts



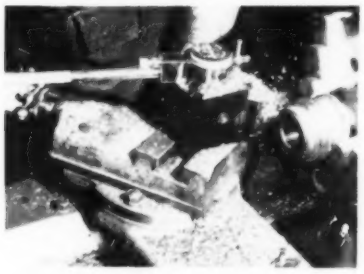
Horizontal Polishing Machine Added to Central Machine Line

New series of horizontal polishing machines, series H-M, has been added to Central Machine Works line of hydraulically operated, multi-purpose machines. The H-M series, for polishing extrusions, sheets, rods, and smaller odd-shaped pieces, is made in standard sizes from 7- to 21-ft stroke.

Machines permit polishing extrusions and sheets the entire length. Features include: Hydraulic operation with provision for obtaining dwell during polishing action; an adjustable stroke with stepless increments from 2 in. to full capacity; hydraulic contour device with plywood cams.

Turning a valve will oscillate the table across the face of the polishing roll during the stroke. Series may be equipped with mechanical polishing-compound applicator or spraying equipment as desired. Machines are standardized in sizes to take work from 6 to 20 ft long.

Central Machine Works, Worcester, Mass



Four-Faced Lathe Toolblock Facilitates Tool Changes

Marvic set consists of a four-faced toolblock and five basic toolholders. Toolblock is said to mount quickly on any engine lathe. Each of its four machine-finished faces has dovetail channels into which the toolholders fit and lock without changing block position.

Advantages claimed for Marvic are: Tool changing is much faster than with conventional holders; four faces permit working closer to the chuck or tailstock; boring, drilling, reaming, and tapping are done with perfect alignment; full swing of the lathe may be utilized; lathe capacity is increased.

Marvic block is available in three standard sizes to accommodate lathe ranges from 10 to 26 in. Price includes T-Pad and stud for attaching block to lathe.

Marvic, Inc, 350 Peninsular Ave, San Mateo, Calif

... INCLUDING

Cold Pointing Machine incorporates four dies mounted in fixed spindlehead of nitralloy steel page 182

Square and hexagonal toolpost turrets provide for repetitive indexing to 0.0003 in. in all twelve positions page 184

Horizontal gear-cutting machine, using radial loading, shaves gear-tooth profiles of large turbine pinions requiring close tolerance page 186

Inclinable press of steel construction features electro-pneumatic clutch and locking commutator page 188

Carbon resistor furnace for ultra-high-temperature work reaches 5000 F in two hours page 190

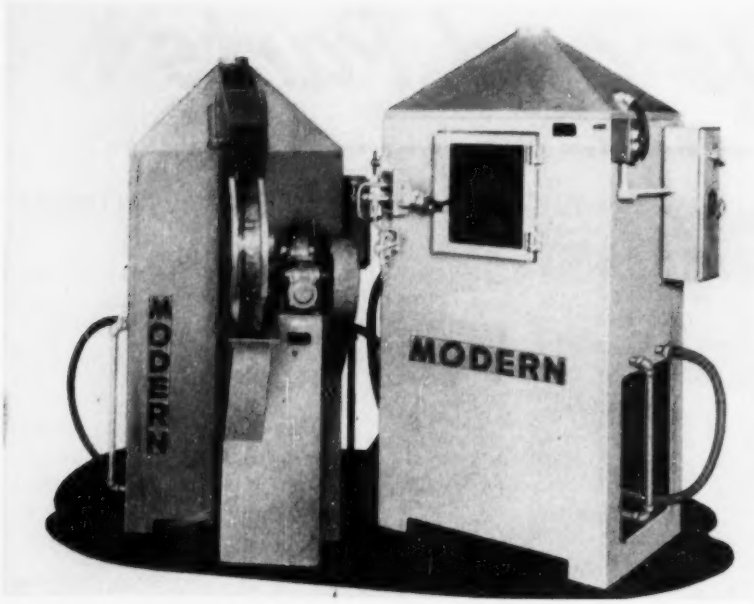
Universal table provides for combination cutting on shapers, millers, and grinders; for drilling spaced holes on drillpress; for boring spaced holes when fabricating jigs on lathe page 192

Heavy-duty, inert-gas, arc-welding torch operates continuously at 500 amp page 192

... and in Aug 3

Popular manufacturer of vertical milling machines introduces 6x12-in.-table surface grinder.

Turret indexing unit with intermittent motion provides basic packaged chassis for variety of special automatic machines.



Maizo Blast Machine Deburs Soft-Metal Parts

Two standard Maizo Blast machines have been developed by Modern Industrial Engineering for fast production deburring of soft-metal parts, using either a continuous rotating process for small parts or a stationary clamping arrangement for larger units. In both models, maize, or a similar soft material, is blasted against parts under factory airline pressure.

Model MA-24 incorporates a ferris-wheel-type fixture which rotates continuously between two reciprocating blasting guns at the rate of approximately one rev every five min. Revolving wheel carries 16 to 24 pieces in holding wires bent to suit the part, and yields a production rate of 192 to 288 pieces per hour. Higher production rates can be obtained, depending on size of the part.

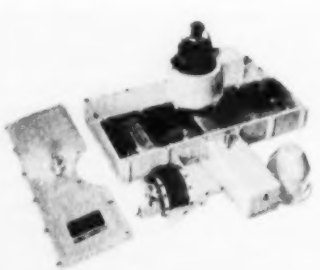
Friction-driven slip clutch permits the operator to retard rotation if necessary. Speed of rotation can be varied as required by hardness of the parts being blasted by changing the drive pulley.

A ½-hp motor belt-connected to a 3,000-to-1 speed reducer drives the ferris wheel. Reciprocating and oscillating blasting arms holding the guns are driven through a crank from a second speed-reduction drive that has its own ½-hp motor. Housing is box-edged welded sheet steel.

Access door has window to allow observation of parts during blasting operation. Machine operates at 60 to 80 psi. Blasting material is recirculated in a completely enclosed system.

Larger parts not suitable to the continuous machine can be handled in Model MA-1, a stationary unit in which parts rotate on a fixed axis. This model handles such parts as impeller housings and rotors. Since the angle at which the blasting guns are set depends on the nature of the part in process, guns are adjustable and machine can be supplied with 2, 4, or 6 guns. A single ½-hp motor and speed reducer supply power for the unit.

Modern Industrial Engineering Co, 14250 Birwood Ave, Detroit 4, Mich



Enlarged Templet Controls Automatic Contour Wheel Dresser

Hoglund Model 42 automatic contour wheel dresser can be permanently mounted to the right of the footstock on inclined-table-type plain cylindrical grinders. Dresser has been adapted to Brown & Sharpe No. 5 plain grinder and also to Norton 6x30 plain grinder; unit will be available with different bases for other cylindrical grinders.

It is said that almost any contour that can be entered by a diamond can be dressed into the wheel with an accuracy of a few ten-thousandths of an inch. The diamond moves across the wheel with an uninterrupted movement; an enlarged templet controls the movements of the dresser and the diamond.

A governor-controlled variable-speed motor operates the mechanism which controls the movement of the diamond. The motor drives a slide through a rack and pinion arrangement which carries both contour and feed templets. Feed templet consists of an inclined plane which determines the ratio of movement of diamond across grinding wheel relative to movement of contour templet slide. Feed templet controls the movement of wheel dresser axially to the grinding wheel.

A secondary slide, also with an inclined plane, has a carbide follower which contacts the contour surface on the templet. This slide, through the inclined plane, gives diamonds a radial movement to the wheel in a ratio predetermined by the ratio of the inclined plane on the secondary slide.

All bearing surfaces are machined to high precision; slides move on ball raceways; raceways are hardened, ground, and lapped. Diamonds are precisely set by means of a microscope fixture with a 40-to-1 magnification.

Width of contour is variable up to 2 in., depending on ratio templet desired; depth of contour is variable depending on ratio templet desired; wheel dia has no max limit; templet ratios are variable from 1:1 to 20:1. Weight of unit is 80 lb.

Hogland Engineering & Manufacturing Co, Inc, 343-2 Snyder Ave, Berkeley Heights, NJ

Chip brush for cleaning machine work and applying lubricants is fitted with horsehair bristles resistant to acids and alkalis common to cutting oils and lubricants. Packed two dozen to shelf box; price, $3 per dozen.

Biltwell Brush Co, 225 S Church St, Rockford, Ill

Surfacing material, called Gam-En-Wood, said to be highly resistant to abrasives, heat, and chemicals, has the weight advantage and mechanical properties of wood. Product uses US Rubber Co's thermosetting plastic, Enrup, as a surface material molded over machined hardwood parts.

Gamble Brothers, Louisville, Ky

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- **PIGS AND PROGRESS.** The complete story of aluminum from mine to finished products. Covers all forms of aluminum. Running time 26 minutes.

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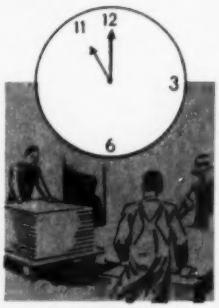

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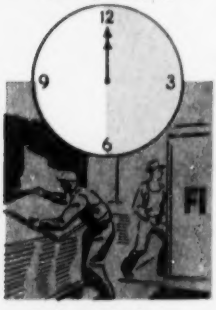
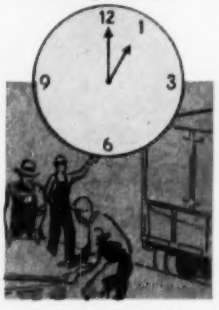


Order on dock



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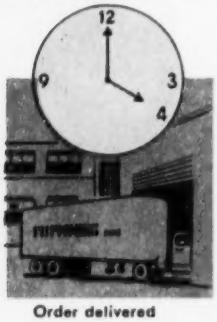
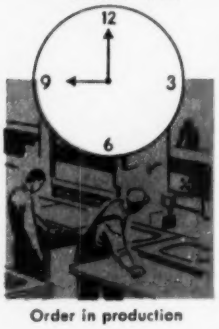


Order delivered



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MACHINES AND ATTACHMENTS

1 RADIAL DRILLS—*Morris Machine Tool Co, Cincinnati 8, Ohio.* 16-page booklet illustrates 11-in. column Mor-Speed units. Features, dimensions, and specifications for 3-, 4-, 5-, and 6-ft arm drills included.

2 TURRET LATHE—*Potter & Johnston Co, Pawtucket, RI.* Bulletin 151 presents illustrated information on 3-U automatic unit. Applications and typical tooling sequences covered.

3 DRILLING MACHINE—*Weiss Stripgit Corp, North Tonawanda, NY.* 8-page catalog DM pictures and describes Deluxe model with optical gaging system built into bridge and slide rail, and Standard model. Setup methods, typical work performed, equipment and accessories included.

4 GEAR FINISHING MACHINES—*Michigan Tool Co, Detroit 11, Mich.* 8-page illustrated bulletin No. V-53 contains data on V-series equipment for processing gears up to 15-ft dia. Specifications and special features covered.

5 TAPPING ATTACHMENT—*Super-Selsmic Corp, Chicago 18, Ill.* 6-page folder on hydraverse device for converting drillpress into precision tapper. Components illustrated and specifications listed.

6 SURFACE GRINDERS—*DoAll Co, Des Plaines, Ill.* 20-page catalog illustrates new line of hydraulic units and "cool grinding" process. Includes detailed data on attachments, accessories, special features, and specifications.

7 MULTIPLE SPINDLE DRILLING MACHINES — *Bench Machine Tool Co, Springfield 7, Mass.* 10-page catalog illustrates and describes W-type 2- and 3-way hydraulic units. Company's cam or hydraulic power units, radial arm tapping machines, and other units described.

8 THREAD & FORM ROLLING—*Reed Rolled Thread Die Co, Worcester 1, Mass.* 41-page bulletin contains comprehensive engineering data and technical information on process. Price, $1.00.

9 MACHINE TOOLS—*Weimer Hellbrunn, Germany.* Three illustrated bulletins, NR 187, NR 184, No. 142 E describe high speed production lathes and heavy-duty center unit. *Industrie-Werke Karlsruhe, Germany.* Three catalogs contain data on transfer presses, hydraulic presses, and the Schaerer Type UM 460 heavy-duty lathes. Attachments and accessories illustrated.

TOOLS AND ACCESSORIES

10 GROOVING TOOL—*Truarc Catalog Service, Waldes Kohinoor, Long Island City 1, NY.* 20-page reference catalog GTE-53 provides facts, figures, charts, and illustrations on equipment for cutting internal recesses. Ramyon, accessories, uses, and case histories included.

11 CLAMPS—*Stanch Tool Co, Detroit 2, Mich.* Catalog No. 5 covers 50 new fixture units in variety of sizes and shapes. Contains full-size tracing template.

12 LUBRICANTS—*Rockwell Mfg Co, Pittsburgh 8, Pa.* 12-page bulletin V-230 describes lubricants, fittings, and methods for Nordstrom valves. Three types and their functions described. Selection chart of recommended uses included.

13 MEASURING SURFACE FLATNESS—*Crane Packing Co, Chicago 18, Ill.* 4-page bulletin illustrates and describes light band reading with Lapmaster monochromatic light and optical flats. Detailed interpretations and instructions.

14 DIAMOND TOOLS—*Mouries & Duncan Co, New York 17, NY.* 20-page catalog offers illustrated and diagrammatic information; covers dressing and boring tools, powders and lapping compounds, and special tools.

15 REAMER SELECTOR—*Lovejoy & Ide, Chicopee, Mass.* Pocket-size chart lists 142 hole sizes from 0.4906 through 0.5019 in. Includes catalog numbers and equivalent sizes for easy ordering.

16 TOOLS—*Wendt-Sonis Co, Hannibal, Mo.* 32-page catalog 53 covers complete line of carbide-tipped reamers, drills,

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milling cutters, toolbits, and carbide blanks. Illustrates features and applications. Drawings, tables, dimensions, and resharpening directions included.

17 PNEUMATIC TOOLS — *Mall Tool Co, Chicago 16, Ill.* 1953 catalog covers complete line of grinders, drills, adjustable clutch screwdrivers, 12-oz high-speed die grinders, and a new angle drill.

18 CUTTERS—*General Cutter Mfg Co, Libertyville, Ill.* 72-page catalog 53-W contains indexed, illustrated information on highspeed steel and carbide routing bits and cutters for non-ferrous metalworking. 18-page catalog 52-A covers routing and milling cutters for non-ferrous work. Ordering information included.

19 MOTORS AND CONTROLS—*Westinghouse Electric Corp, Pittsburgh, Pa.* Machine Tool Electrical Handbook applies to seven major groups of machine tools. Detailed sections on applications, selection guides, accessories, and services. Request on company letterhead.

HEAT-TREATING AND WELDING

20 DYNA-KILNS and ELECTRIC FURNACES—*L & L Mfg Co, Chester 20, Pa.* 16-page catalog and parts manual offers detailed information on 27 models, front or top loading, to 2050 and 2300 F temperature ranges.

21 ELECTRODES—*Air Reduction Sales Co, New York 17, NY.* 16-page catalog 1318 (Form ADC 650) contains thumbtab data on more than 30 different electrodes, described as to chemical analysis, procedure for welding, and application. Selection, mechanical properties, testing, and AWS-ASTM specifications included.

22 CONTROL INSTRUMENTS — *Bristol Co, Waterbury 20, Conn.* Illustrated catalog P1255 covers instruments for furnaces, ovens, dryers, and kilns; features potentiometer and millivoltmeter pyrometer controllers, recorders, and indicators. Includes diagrams of arrangements and dimension sketches.

PLANT SERVICE EQUIPMENT

23 MATERIAL HANDLING SYSTEM —*Union Metal Mfg Co, Canton, Ohio.* 11-page booklet 55 illustrates material positioning with bin boxes and gravity-fed hoppers, tiering, storing, and dumping with multi-duty boxes and trays.

24 CONTAINERS— *Weyerhaeuser Timber Co, Tacoma 1, Wash.* 4-page bulletin pictures and describes Ply-Veneer panel stock and boxes for handling and storing variety of items.

25 ELECTRIC TRUCKS — *Automatic Transportation Co, Chicago 39, Ill.* Six bulletins on complete standard Skylift C/ line with capacities of 1000, 1500, 2000, 3000, and 4000 lb.

26 BLOWERS AND EXHAUSTERS— *Air Appliance Div, US Hoffman Machinery Corp, New York 3, NY.* Bulletin A-952 describes design and performance features of multistage centrifugal units for 1 to 9 psi pressures or vacuum from 2 to 15 in. mercury. Includes applications and performance curves.

27 FORK TRUCK LUBRICATION— *Mercury Mfg Co, Chicago 9, Ill.* 4-page Alemite folder 34-13 offers illustrated information on Alemite Accumeter controlled lubrication system applied to Yale Model 450 truck.

28 CHAIN AND SPROCKETS—*Chain Belt Co, Milwaukee 1, Wis.* 56-page Abbreviated Catalog 53-110, with pictorial index, provides illustrated data on cast and steel chain, cast tooth sprockets, belt conveyor idlers, and spray nozzles. Listings and prices included.

29 ELECTROPLATING POWER SUPPLIES—*General Electric Co, Schenectady 5, NY.* 16-page illustrated booklet GEC—970 describes line of manually controlled, automatically regulated metallic rectifier power supplies. Advantages, applications, operation, ratings, dimensions, and specifications covered.

30 PROTECTIVE BAGS — *Jet-Pak, Newark, NJ.* 4-page folder describes treated VCI-lined, cushioned bags to protect metal parts against rust and corrosion. VCI principle blankets parts with invisible, dry vapor which penetrates blind holes and cavities.

31 METAL HOSE—*Titeflex, Inc, Newark 4, NJ.* 48-page catalog 200 provides comprehensive information, including frictional losses vs flow rates, and illustrated data on how seamed metal hose is made. Specification page included.

PARTS AND MATERIALS

32 WIRE THREAD INSERTS—*Heli-Coil Corp, Danbury, Conn.* 32-page catalog 643 describes uses in design, production salvage, and maintenance. Covers sizes 2, 2B, 3 and 3B fits. Engineering data and specifications.

33 ELECTRONIC TUBES — *Amperex Electronic Corp, Hicksville, LI, NY.* 20-page bulletin contains detailed description, replacement guide, and accessories.

34 NON-FERROUS CASTINGS—*Wellman Bronze & Aluminum Co, Cleveland 30, Ohio.* 20-page illustrated catalog 53 outlines facilities for range of aluminum, magnesium, and bronze alloy castings. Includes metallurgical tables on characteristics of each alloy.

35 SWITCHES—*Wells Sales, Inc, Chicago 32, Ill.* 16-page illustrated catalog C-11 offers data on 150 types. Prices and specifications listed.

36 SINTERED METAL PARTS—*US Graphite Co, Saginaw, Mich.* 41-page catalog contains detailed, illustrated information on Gramix bearings, gears, and other parts produced in variety of ferrous and non-ferrous grades from metal powders. Typical applications, and survey sheets to aid in planning requirements are included.

37 PUMPS—*Milton Roy Co, Philadelphia 18, Pa.* 40-page bulletin 555 describes motor-driven, controlled-volume units; design, construction, capacity-pressure selection tables and adjustments detailed. Application and selection charts included.

38 CEMENTED CARBIDES—*Kennametal, Latrobe, Pa.* 16-page booklet provides technical data on Kennametal and Kentanium; includes mechanical and physical properties.

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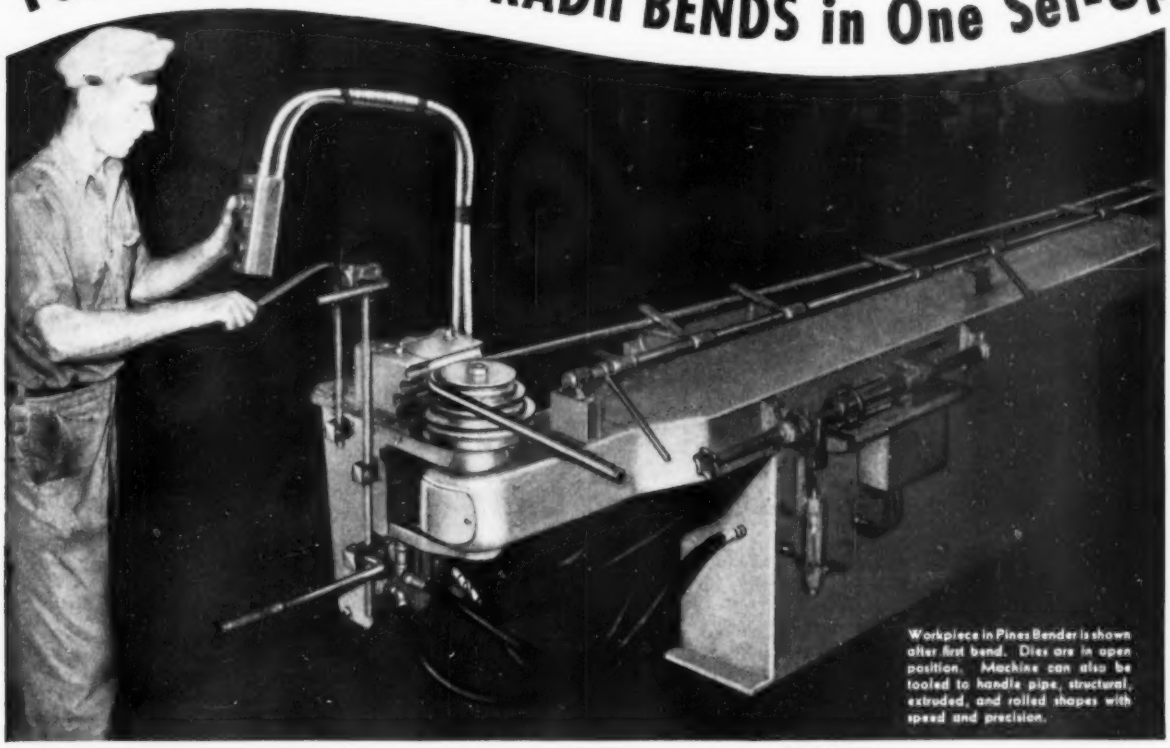
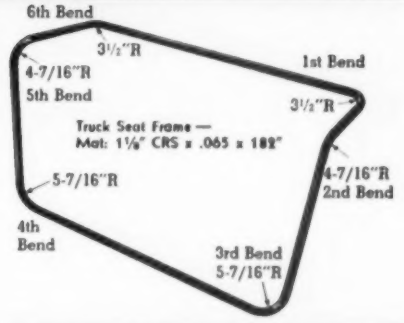
Forming MULTIPLE RADII BENDS in One Set-Up

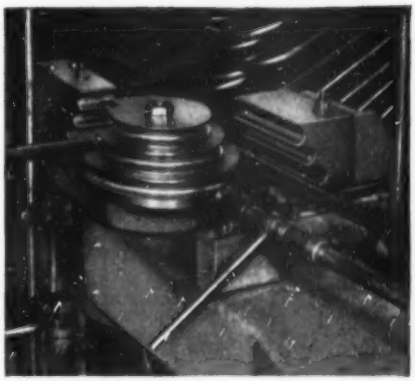


Workpiece in Pines Bender is shown after first bend. Dies are in open position. Machine can also be tooled to handle pipe, structural, extruded, and rolled shapes with speed and precision.

HOW A PINES AUTOMATIC BENDER Speeds Production at Randall Company

The Pines Automatic Bender set-up illustrated here is one employed by The Randall Co. of Wilmington, Ohio, to speed production of truck seat frames requiring six bends of three different radii. The machine and tooling, designed and built by Pines, forms the complete frames on one machine. Operations are performed in sequence with a triple die set-up. Tool changes are eliminated, and daily production maintained at an average rate of 240 bends per hour. Machine is push-button controlled and hydraulically operated — is adaptable to a wide range of production bending jobs, handles serpentine, coil, compound, and multiple bends without marking or distorting. Complete range of sizes for light or heavy work are available.





Close-up of pressure and clamping die in open position after completing fourth bend. For each radius operator simply positions stock in proper grooves of triple die. Planes of bends are determined by floor mounted gauges.

When you have a production bending problem, call on Pines Engineers for assistance. Chances are they can also help you save time and cut costs.

FREE DATA SHEETS

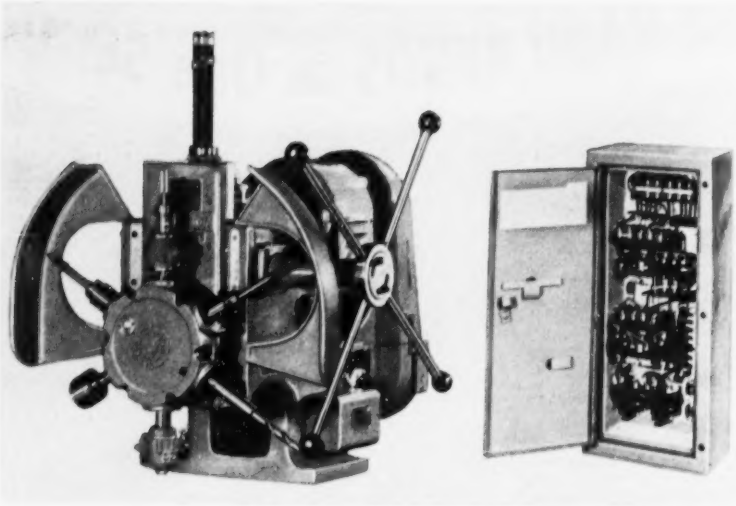
Write today for free copies of "Pines News" illustrating and describing bending and tooling techniques on actual jobs.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

BENDING • DEBURRING • CHAMFERING • THREADING MACHINERY

672 WALNUT • AURORA, ILLINOIS



Burgmaster Flange-Mounting Unit Adapted From Standard Model 2A

Burgmaster flange-mounting model 2B is an adaptation of the standard model 2A machine. Model 2B can be mounted on any type of base and two or more machines can be mounted on the same base at various angles so operations can be performed on different planes at the same time.

Unit is equipped with separate-mounting electric panel and chain counterweight device. Model can be obtained with automatic hydraulic feed. Spindle speeds, ram travel, feed handles, motor, and other features are the same as on model 2A.

Specifications include: 8-in. spindle travel, 12 preselective spindle speeds (225 to 3000 rpm—4 speeds per spindle); 12-in. throat depth; max clearance from chuck nose to bottom of mounting flange is 8¾ in.; mounting flange is 12x15 in.

Burg Tool Mfg Co, 3743 Durango Ave, Los Angeles 34, Calif

Dual Pilot Bars for No. 3, 4 Warner & Swasey Turret Lathes

Viking dual pilot bar attachment was developed to reduce vibration chatter, hold closer tolerances, and assure precision cuts on No. 3 and 4 Warner & Swasey ram-type turret lathes.

Two stations of the turret lathes can be supported with the pilot bar which swings in a small circle from one position to the other. Pilot tubes can be adjusted in or out to cover all variations in the projection of work from the chuck.

Precision adjustment on each of the two stations is automatic. After cutting tool is moved into position, precision collar on the pilot tube is adjusted over the pilot bar by loosening and retightening four capscrews.

Viking Tool & Die Co, 3520 E 43rd St, Minneapolis, Minn

Built-In Control-Valve Model Of Standard Waukee Flo-Meter

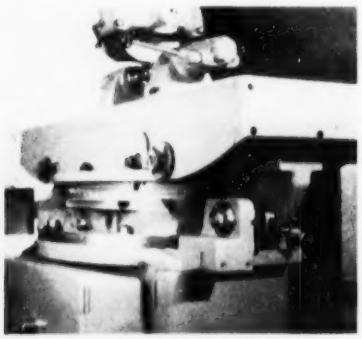
Built-in valve model of standard Waukee flo-meter is available in 11 different sizes. Valves are located at top of meter; no special holes need be drilled when equipment is panel-mounted.

Meters are said to be easy to read because oil contained in glass tube prevents accumulation of dirt.

Meters are available for measuring air, ammonia, butane, carrier gas, city gas, dissociated ammonia, endothermic gas, exothermic cracked (rich), exothermic cracked (lean), hydrogen, natural gas, oxygen, propane, and purging gas.

Standard Waukee flo-meters can be converted by removing threaded top cap and installing control valve and seat.

Waukee Engineering Co, Milwaukee, Wisc



Conventional Crowning Added To Diagonal Shaving Machine

Gear-tooth crowning by conventional method of rocking machine table during shaving cycle has been added to National Red Wing Model GCU by redesign. Crowning on this machine formerly required a specially formed cutter, but now can be done with standard rotary cutter while work is being reciprocated in line with its axis.

Rocking action of table is accomplished by means of a central pivot and cam which causes each end of table to rise slightly as end of cutting stroke is approached. Point of maximum crown, usually at center of tooth, may be shifted either way by changing position of work with reference to cutter. Amount of crown is a function of the cam adjustment.

When gear teeth are to be shaved without a crown, cam is disengaged and table remains horizontal throughout its stroke. This arrangement allows table to be set at desired taper angle and locked.

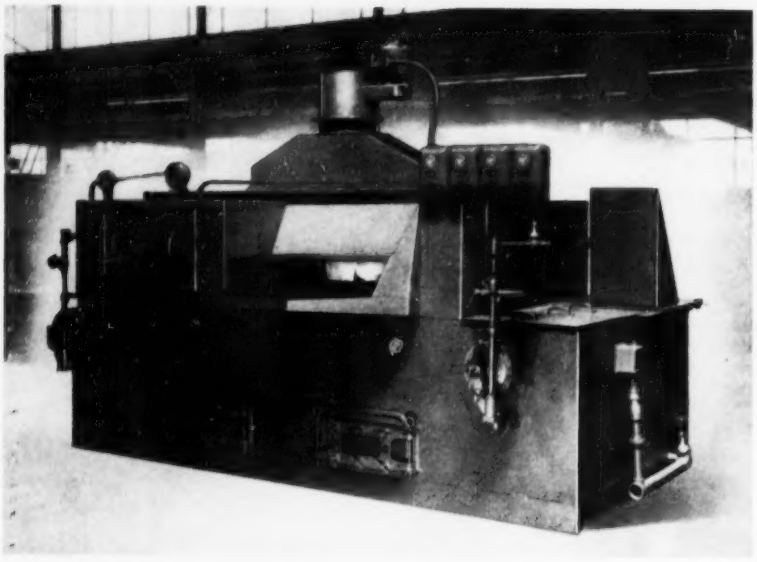
Optional equipment includes the differential up-feed mechanism which provides automatic precision up-feed in selected increments throughout shaving cycle and automatic return to proper backlash position at end of cycle. Any number of cutting strokes may be used, each with its own increment of feed and any number of idling strokes.

National Broach & Machine Co, 5600 St Jean Ave, Detroit 13, Mich

HOW DO YOU MEASURE OBSOLESCENCE?

Never lose sight of the fact that your cost must be as low as your competitor's if you expect to stay in business.

Age, by itself, is only a fair measuring stick for obsolescence. A machine tool is obsolete, when replacement by a new machine, offering production economies, will pay a substantial dividend on the net investment. Many relatively new machines are now obsolete because more efficient ones have been developed that will outproduce them at lower cost. In the last six months Seneca Falls has announced new machines which, in specific cases, are paying for themselves out of savings over methods which were *efficient* 12 months ago. ● Seneca Falls Machine Co., Seneca Falls, N. Y.



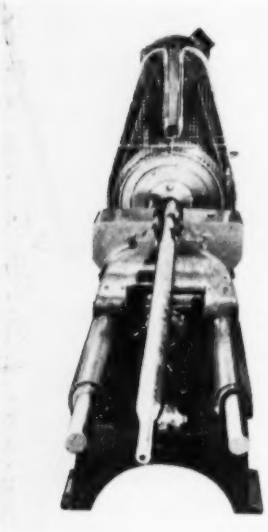
Washing Machine Rides Parts on Turntable

Blakeslee washing machine incorporates a turntable which returns clean parts to the man who put the work in the machine. Turntable takes work through spray for washing and rinsing, through air blowoff section, and back to the loading-unloading station. Temperature is maintained by thermostatic valve.

Special motor-driven pumps circulate the washing and rinsing solutions. Air is controlled by automatic trip mechanism so it is on only when needed.

Unit is available in variety of sizes.

G S Blakeslee & Co, 1822 S 52nd Ave, Chicago 50, Ill



Cold Pointing Machine Has Stationary Dies

Abbey Etna cold pointing machine is built in four sizes for handling tubes and bars of steel and non-ferrous metals up to 6 in. in dia. Four dies are mounted in a fixed spindlehead of nitralloy steel; thus there is no possibility of the dies revolving the tube with risk of injury to the operator. Cage of annular rolls revolves around the spindlehead, blows being transmitted to dies through hammer blocks. Inner track of rolls is the spindlehead; outer track is fixed in the flywheel.

Die wear is taken up by means of taper wedges between dies and hammer blocks, wedges being adjustable from back of machine. Amount of die opening is controlled by parallel cotters inserted in side of hammer block and spindlehead die slot. Time necessary to change dies is reportedly cut to a minimum by quick-die-change arrangement on front of machine. A stop, operated from rear, controls length of point; adjustable guide is provided at front of machine.

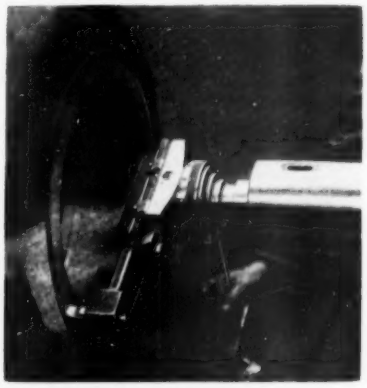
Production tests are said to indicate that steel tubes up to 2 in. in dia can be manually fed into machine by one man. Non-ferrous tubes up to 2½ in. and aluminum tubes up to 3 in. can also be pointed manually. For tubes above these diameters, power feed is usually necessary.

No. 11A machine for tubes up to 3-in. dia (Al.) is driven by 15-hp motor for non-ferrous work and 20-hp motor for steel work. Drive is through V-belts, motor platform being hinged and readily adjustable. Lubrication is by means of one-shot grease system using high-temperature grease.

Power feeders are hydraulic-type and, for use in tube pointing, are fitted with an oscillating hydraulic self-centering vise. For certain other types of work, rotary air chuck can be fitted to feeder. Machines with feeders are equipped with device to eliminate noise when machine is not actually swaging.

Production rates are reportedly high—2-in.-dia mild steel tube by 6 SWG can be swaged down to 1 13/16-in. dia at floor-to-floor production times 18 to 20 sec each (production rate of 180 to 120 points per hr), by one man.

Abbey Etna Co, Sales Organization of Etna Machine Co, 3430 Maplewood Ave, Toledo, Ohio



New Models of German Facing and Boring Heads

Karl Neise announces the addition of models UPA 6 and UPA 6-S7 to the Wohlhaupter line of universal facing and boring heads. Units are applicable to boring mills, jig borers, radial drilling machines, lathes, millers, and other machine tools. Device can reportedly be used to great advantage for boring, facing, recessing, undercutting, taper and form turning, and for threading stationary work without reclamping.

All units have automatic feeds, end release and end return, adjustable stop, and are adaptable to all standard machines. UPA 6 has boring and facing range up to 31½ in. and UPA 6-S7 up to 36¼ in.

Imported by Karl A Neise, 381 Fourth Ave, New York 16, NY

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LOS ANGELES Gory Electric Service
LOS ANGELES Larsen-Hogue Elec. Co.
MARYSVILLE Kinney Electric
MODESTO Industrial Electric Company
OAKLAND T. L. Rosenberg Company
OCEANSIDE The Electric Motor Service
PASADENA Pompey Elec. Motor Service
POMONA Pomona Elec. Mach. Co., Inc.
RED BLUFF Red Bluff Industrial Elec.
RIVERSIDE Backstrand Brothers
SACRAMENTO Williams Electric Service
SALINAS Quality Electric Company
SAN DIEGO Bay City Electric
SAN JOSE Kurze Electrical Works
SANTA CRUZ Coast Electric Motor Service
SANTA ROSA Leete Electric Motor
STOCKTON Stanley Electric Motor Co.
VENTURA Oldfield Electric Company
WATSONVILLE C. H. Elec. Motor Works
WILMINGTON Ets-Hokin & Galvan
WOODLAND Industrial Motor Electric

COLORADO
DENVER Tree Electric Service
DENVER Weaver Electric Company
FORT COLLINS Al Pennock Electric Motor Service

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BRIDGEPORT Electric Motor Sales & Service
NEW BRITAIN Monarch Electric Co.
NEW HAVEN G. E. Wheeler Company

DELAWARE
WILMINGTON McHugh Electric Company

DISTRICT OF COLUMBIA
WASHINGTON, D. C. Carty Electric & Armature Service, Inc.

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MIAMI Peninsular Armature Works
PANAMA CITY West Florida Elec. Service

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ATLANTA Cleveland Electric Company
MACON Electric Repairs, Inc.
SAVANNAH Electric Motor Service Co.

IDAHO
BOISE L & K Electric Motor Co.
LEWISTON E. D. Smith & Son
POCATELLO C-L Electric Company

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CHICAGO Excel Electric Service Company
CHICAGO Lehman Electric Company
CHICAGO Sievert Electric Company
DECATUR Industrial Electric Shop
EAST ST. LOUIS Illinois Elec. Works, Inc.
LA SALLE Monarch Electric & Supply Co.
MARION Giles Armature & Elec. Works, Inc.
PEORIA Hendricks Electric Company
QUINCY Electric Motor Repair Co.
ROCKFORD Rockford Industries, Inc.
ROCK ISLAND Torrance Elec. Co., Inc.

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FORT WAYNE V. M. Nussbaum & Company
INDIANAPOLIS Moran Elec. Serv. Co.

IOWA
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DES MOINES Electric Equip. Co., Inc.
DUBUQUE Dubuque Electric Motor Serv.
MARSHALLTOWN Egleston Electric Co.
MASON CITY Zach Bros. Electric
SPENCER Pixler Electric Co.

KANSAS
GARDEN CITY Motor Electric Shop
GREAT BEND Johnson Electric Co., Inc.
HUTCHINSON Hilton Electric Company
SALINA Mid-States Armature Works, Inc.

KENTUCKY
LOUISVILLE Krauth-Campbell Electric Company, Inc.
MADISONVILLE Whitfield Electric Co.

LOUISIANA
ALEXANDRIA Alexandria Armature Co.
LAFAYETTE Hub Armature Works
LAKE CHARLES Gulf Armature Company
MONROE Poulan's Electrical Company
NEW ORLEANS New Orleans Armature Works
SHREVEPORT Shreveport Armature & Elec. Works

MAINE
BREUER Leen's Electric Motor Service

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BALTIMORE Keystone Electric Co., Inc.
HAGERSTOWN Hagerstown Equip. Co., Inc.

MASSACHUSETTS
BOSTON Sandman Electric Co., Inc.
BOSTON Skillings Electric Company
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MICHIGAN
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DETROIT Michigan Electric Motors Co.
DETROIT Miller-Seldon Electric Company
KALAMAZOO Kalamazoo Elec. Motor Serv.
LANSING F. D. Hayes Co.
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PONTIAC Hodges Pump & Motor Company
PORT HURON Flinchbaugh Electric Co.
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RALEIGH Elec. Motor & Repair Co.
ROCKY MOUNT Hammond Electric Co.

OHIO
CHILLICOTHE Duffy Electric Company
CINCINNATI Barkley Electric Company
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CLEVELAND Center Elec. Service Co.
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MANSFIELD Phoenix Electric Co.
MARION Marion Elec. Motor Service, Inc.
NEW PHILADELPHIA Fenton Bros. Electric
SPRINGFIELD The B & M Electric Co.
TOLEDO Romanoff Elec. Motor Service
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MUSKOGEE Electric Company
MUSKOGEE Gehee Electric Company
NOWATA Gordon Machine & Electric Co.
OKLAHOMA CITY Southwest Electric Co., Inc.
TULSA Bartlett Electric Co.

OREGON
EUGENE Kalen Elec. & Machine Co.
KLAMATH FALLS Ray Bigger Elec. Equip.
NEWBERG Gibbs Electric Company
PORTLAND Reed Electric Company
ROSEBURG Ridenour Electric Company
SALEM Walton Brown Electric Company

PENNSYLVANIA
ALLENTOWN H. N. Crowder, Jr., Company
ALTOONA H. D. Force Co.
EASTON Stokes Engineering & Supply Co.
ERIE Erie Electric & Machine Co.
LANCASTER Fidelity Electric Company
NORRISTOWN Coleman & Schmidt
PHILADELPHIA Atlantic Elec. Motors Co.
PHILADELPHIA J. J. Smith Elec. Motor Co.
PITTSBURGH Electric Mfg. & Repair Co.
POTTSTOWN Mellon Engr. Co.
READING Standard Elec. Service Corp.
WILLIAMSPORT G. I. Electric Company

RHODE ISLAND
PAWTUCKET New England Machine & Electric Company
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GREENVILLE Southern Elec. Service Co.
SPARTANBURG Southern Elec. Service Co.

TENNESSEE
KNOXVILLE Tennessee Armature & Electric Company
MEMPHIS Frank Stevens Electric Co.
NASHVILLE Electrical Machinery & Supply Co.

TEXAS
BEAUMONT Elec. Machinery & Repair Co.
CISCO Walton Electric Company
CORPUS CHRISTI Bradleys' Motor & Armature Works
FORT WORTH Warrington Electric Shop
HOUSTON Roy A. Berentz Company, Inc.
HOUSTON Texas Armature Works
LUBBOCK Lubbock Electric Company
LUFKIN Electric Machinery & Repair Co.
McALLEN Motor Armature Works
SAN ANTONIO Electric Motor Service & Sales Co.

UTAH
SALT LAKE CITY Schraga Electric Co.

VERMONT
BARRE Cushman Electric Co.

VIRGINIA
NORFOLK Virginia-Carolina Electrical Works, Inc.
RICHMOND Elec. Motor & Repair Co.
ROANOKE Lloyd Electric Company
STAUNTON Johnson Electric Company

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EPHRATA Gardner Electric
LONGVIEW Longview Electric
MOUNT VERNON Mount Vernon Electric Motor Service
OKANOGAN H. H. Hall Motor Shop
SEATTLE Seattle Electric Works
SPOKANE Tinling & Powell
WALLA WALLA Berry Electric Company
WENATCHEE Pacific Electric Service
YAKIMA Copper Elec. Motor Service Co.

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CLARKSBURG Barnes & Brass Electric Co.
WHEELING Whitney Electric Co.

WISCONSIN
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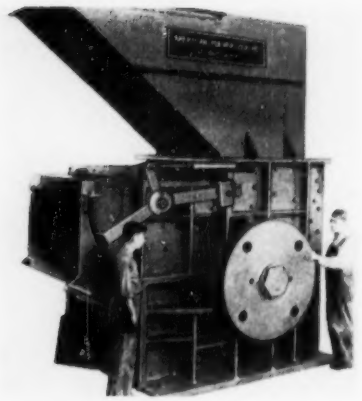


American Metal Turnings Crusher

Crusher was designed to reduce metal turnings, aluminum castings, such as crankcases and pistons, and other forms of scrap at a rate of 35 to 50 tons per hour. The crusher is recommended for large scale operations.

The basic construction is similar to other models of American metal turnings crushers, but this model 60-50 is larger throughout and has a capacity three or four times greater. Tremendous kinetic and centrifugal forces are exerted on the turnings or castings by the massive manufacturer states. The rings are flexibility of the rolling ring principle permits these rings to pass over heavy tramp metal that might damage other types of crushers, the manufacturer states. The rings are reversible for longer life.

American Pulverizer Co, 1267 Macklind Ave, St. Louis, Mo

Wedge-Lock Hexagonal and Square Toolpost Turrets

Olson Wedge-Lock square and hexagonal toolpost turrets provide for repetitive indexing in all twelve positions to plus or minus 0.0003 in. Turret body does not raise up when indexing; never during cycle of operations does the head leave its hardened and ground tapered seat.

Multiple-gear-tooth crown clutch with its zero-backlash splined member is said to ensure continual precise indexing in any and all twelve positions. Splined handle allows operator to position it easily.

Interchangeable square and hexagonal types are available with distance from top of lathe compound to center-line ranging from 1 to $2\frac{3}{4}$ in. and price from $195 to $330 for the square and $260 to $375 for the hexagonal.

Olson Industrial Products, Inc, 40 West Water St, Wakefield, Mass

Liquid Abrasive Blasting Machine

Redesigned Jet Blast liquid abrasive blasting machine is engineered for continuous use without costly downtime. Machine cleans, finishes, burrs, blends, and etches a wide variety of dies, tools, molds, and other parts. Abrasive ranging from 60 to 5000 standard screen size can be handled and reversible pump beneath cabinet reportedly permits change of abrasive slurry in less than 5 minutes. Special method of maintaining slurry in suspension is said to permit higher concentration of abrasive at point of work and increase speed of operation.

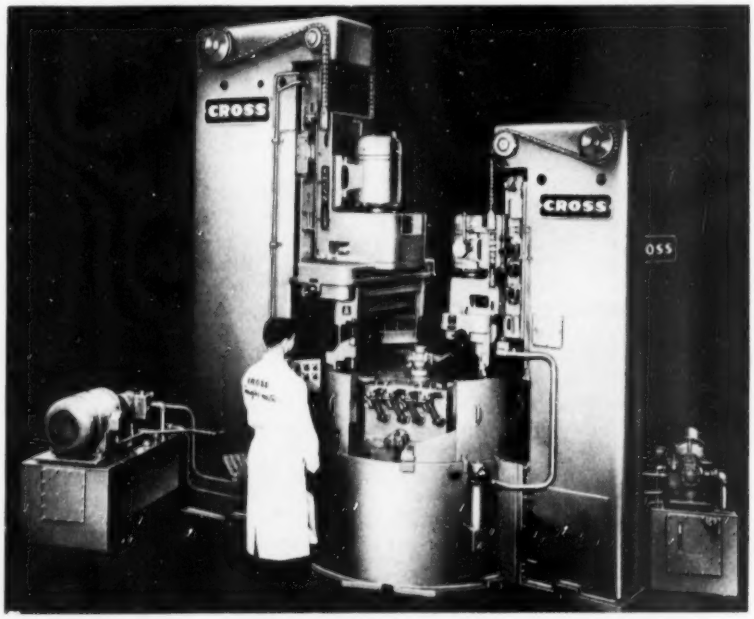
Blower is only moving part; slurry is drawn up by siphon injection and propelled from blasting nozzle by means of high-velocity air stream. Size of abrasive particles, concentration of abrasives in solution, distance between nozzle and work, and air pressure can all be varied to produce the desired results.

Machine is claimed to be particularly effective in removing rust, scale, and other deposits. Sharp edges are retained and metal removal is reportedly held to 0.0001 in.

Manufacturer reports that operators require little training. Work is inserted through access door and operator reaches in through gauntlet-protected armholes. Work is held in one hand or placed on table and stream is directed by other hand. Control is achieved by padded knee pedals, one governing the flow, the other the cleaning of light and observation ports.

Jet Blast is available from stock in three standard models and can be furnished in size required. It can be equipped with turntable to speed handling of pieces and furnished with as many as eight spray guns. In larger models, jets can be arranged to produce automatic or semi-automatic operation. Machines can be used for dual operations with two sizes of abrasives, one for rough cleaning and the other for finishing.

R W Renton & Co, 868 Addison Rd, Cleveland 3, Ohio



CROSS MACHINE DRILLS AND MILLS 600 automotive connecting rods per hr. Unit has five stations: loading, milling the lock slot, and three for drilling the stepped oil hole. Parts are held on motor-driven index table; work-holding fixtures are hydraulically operated. Construction conforms with JIC standards — *The Cross Co, Detroit 7, Mich*

WHAT'S YOUR GUESS ON THIS

Machinability Comparison?

ENDURO STAINLESS STEEL BARS ARE —% AS MACHINABLE AS BESSEMER SCREW STOCK

Would You Say

(a) *42%* (b) *67%* (c) *100%*
(d) *33%* (e) *90%*

?

YOU CAN APPLY the high physical and chemical properties of ENDURO Stainless Steel to duplicate parts you're running now —and still get fast automatic production.

Free-Machining ENDURO Bars are cold-finished by Republic's Union Drawn Steel Division especially for that purpose. They provide close tolerances, accuracy of section, uniform soundness, and fine surface finish.

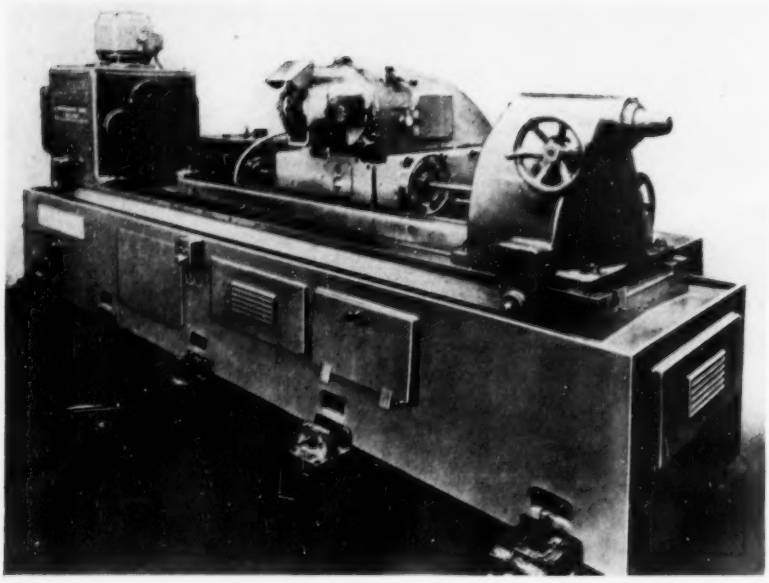
Two grades are fully 90% as machinable as Bessemer screw stock. If 90% was your answer to the question above, you've probably had experience with Free-Machining ENDURO Bars. If you haven't, Republic metallurgists will be glad to give you prompt assistance on applications, processing, and use. Free-Machining ENDURO also is available in hot-rolled bars and in wire. Get more details from your nearest Republic District Sales Office, or write:

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Republic ENDURO®
FREE-MACHINING
STAINLESS STEEL

REPUBLIC STEEL

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing



English Machine Shaves Gears by Radial Loading Method

David Brown Machine Tools horizontal gear-shaving machine was designed for shaving gear-tooth profiles of large turbine pinions where close tolerances and high-quality finish are required.

The machine, David Brown-Muir S24H, will shave pinions of 4- to 24-in. dia up to 100 in. long. Shaving is done by the radial loading method; both flanks of the gear tooth are cut simultaneously. If required, an oil-cooled brake can be fitted to the cutter spindle to allow single-side or selective shaving. Guideways in the main bed—a one-piece casting—provide means for locating the driving head and tailstock, and for the saddle carrying the shaving-cutter head.

Complex drives are eliminated by the adoption of independent driving units for both work-driving head and cutter-saddle traverse. Angular adjustment of the shaving-cutter head is made by hand-operated worm and wheel, and vernier scale facilitates accurate setting. Final fine adjustment is achieved by use of dial indicator in contact with setting bar located by slip ring in cutter head.

Work-drive head is fixed to bed and powered by constant-speed 5-hp motor. Spindle speeds range from 21 to 300 rpm.

Other machines have capacities of 4½ to 48 in., 100 in., and 200 in.

Imported by Morey Machinery Co, Inc, 410 Broome St, New York 13, NY

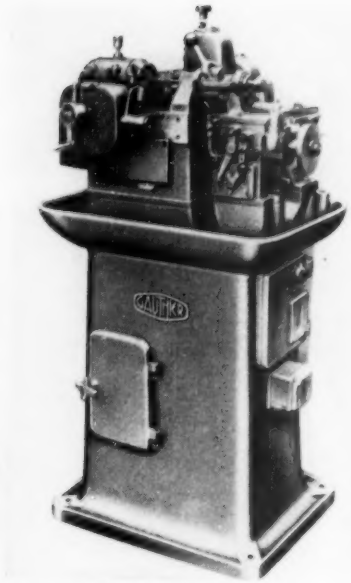
Black Granite Layout Plate

Collins Microflat Co has developed a line of black granite layout plates to supplement its lines of surface plates. These layout plates are produced at a lower cost because their accuracy is only 0.0002 in. per ft. In addition, they do not have clamping edges, thus eliminating sawing of edges for clamping purposes.

Except for wider tolerances and elimination of clamping edges, these layout plates reportedly have the same advantages as the regular line of Collins precision 2- and 4-clamp-edge surface plates. They are non-rusting, non-warping, non-deflecting, easily washable, temperature-inert, and moisture-repellent.

Layout plates are available in sizes from 12x18 in. to 36x48 in.

Collins Microflat Co, 2326 E 8th St, Los Angeles 21, Calif



German Machine Hobs Gears With Dia from 1/16 to 2⅜ in.

Gauthier precision gear hobber, model W-1, is available from Eric Bachmann Co. It is stated that special design and layout permits economical production of small quantities of spur gears, pinions, and segments, and quick changeover to large quantity production at high speeds with minimum initial tooling cost.

A worm-drive backlash-eliminating feature is incorporated; machine will produce to a concentricity within 0.00008 in. No cams have to be made and exchanged when changing from one gear to the next; all adjustments are made by exterior controls and change gears. Range is from 1/16- to 2⅜-in. OD. Max gear width is 1-9/16 in. Gears can be cut with any no. of teeth from 6 to 230 and pitch dia from 32 to 170.

Machine is available with four basic setups: (1) manual chucking of gears and pinions with fully automatic hobbing cycle; (2) batch hobbing of narrow gears with deburring attachment; (3) plunge hobbing of narrow gears and worm wheels; (4) automatic magazine feeds of pinions and shafts with continuous, fully automatic operation.

Eight hobbing speeds are available between 500 and 2500 rpm. Full set of change gears supplied with machine enables feeds from 0.0004 to 0.08 ipr to be obtained. Change gears are supplied for hobbing gears with the following numbers of teeth: 6, 8, 10, 12, 16, 20, 24, 32, 40, and 48.

New York pier-delivery price is below $2,000.

Imported by Eric R Bachmann Co, 27-11 41st Ave, Long Island City 1, NY

The Independent Lock Co.
Fitchburg, Mass.

KEEPS PRODUCTION COSTS DOWN...

MAKES BETTER DOOR CLOSERS *with*

SUNNEN® HONING

PROBLEM: To produce smooth, accurate door closer housings at higher rate; eliminate selective fitting and speed assembly.

MATERIAL: Cast iron (or brass)
HOLE DIAMETER: 1⅞″
HOLE LENGTH: 6¾″ overall (Surfaces honed are 2 tandem lands 2⅝″ wide)
STOCK REMOVAL: .005″
FINISH: Smooth
TOLERANCE: +.0002″, −.0000″
GAGING EQUIPMENT: Air gage

SOLUTION: Sunnen Model MBB-1290D Honing Machine, with Simplex type mandrel and P-28 type stones, and Sunnen Honing Oil.

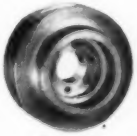
RESULTS: Better fit and improved bearing surface have eliminated selective fitting and increased assembly speed more than 100%. Close fit permits using special fluid, makes door closers efficient over wide temperature range.

Actual production rate of above housing is 44 per hour. Other sizes as high as 80 per hour including gaging.

TYPICAL HONED PARTS

Part from button-hole machine

Steel worm gear



Bronze motor bearing

SUNNEN PRODUCTS COMPANY
7925 Manchester Avenue, St. Louis 17, Missouri
Canadian Factory: Chatham, Ontario

In plant after plant Sunnen Honing Machines have been the solution to production problems that could not be handled by drilling, reaming, boring, lapping, or grinding.

You'll find them economical for job lots as well as long production runs... for de-burring as well as micro-fitting... for producing holes to engineering specifications as well as for eliminating manufacturing bottlenecks.

These machines generate geometrically perfect holes with fast stock removal... produce a guaranteed accuracy of .0001″ or better and surface finish to 2 micro-inches RMS... have a diameter range of ⅛″ to 2⅝″... require no jigs or fixtures... are used in thousands of plants in production, tool room, maintenance, salvage. Average installation costs less than $1,000.

Sunnen Honing Machines may be *your* answer, too. Investigate now.

Mail the Coupon NOW for this Free Booklet

Sunnen Products Co.
7925 Manchester Ave., St. Louis 17, Missouri

☐ Send Free Booklet on Sunnen Honing

☐ Have A Field Engineer Call, no obligation

Name.....

Company.....

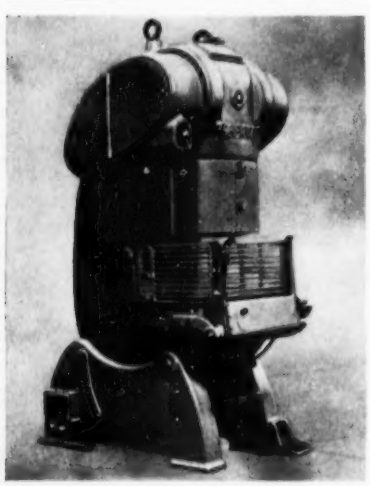
Address.....

City..... Zone..... State.....

Lempco Straightening Press Handles 1- to 10-ft Shafts

Straightening press has frame with underslung hydraulic pump and cylinder fastened to shaft by open-throat clamp. Pressure on shaft is exerted at one or more points along its length until the dial indicator mounted on the frame shows identical reading at each point. V-blocks and pump can be moved along the bed, making it possible to straighten work from 1 to 10 ft long with minimum handling.

Lempco Products, Inc, Industrial Division, Bedford, Ohio



Inclinable Press and Other Spiertz (French) Machines

Rahway Machine Tool Corp handles Spiertz presses, shears, pressbrakes, and other machines. Illustrated is the new-style inclinable press replacing the old cast-iron frame, key-operated-clutch machine.

The new machine is built of steel; gears and eccentric shaft and crank run in oil-bath; provision is made for automatic greasing of slide-bar guides; all moving parts are protected by housing; electro-pneumatic clutch (pedal-actuated) allows the press to be stopped at any position of the slide; protective screens close before clutching, can be removed in a few seconds; and stroke-counter is inaccessible to operator during production run.

Locking commutator permits: descent of slide in small increments; stroke-by-stroke operation with automatic stop at top of travel; and stop-button to make it impossible to engage the press.

Another featured machine is a horizontal, toggle-action press for cold-expanding metal tubes. Frame of machine is of laminated steel plates. Unit is provided with electro-pneumatic clutch with pushbutton controls. Lubrication is partly automatic, the gears being immersed in oil and automatic sprayers lubricating parts of the press.

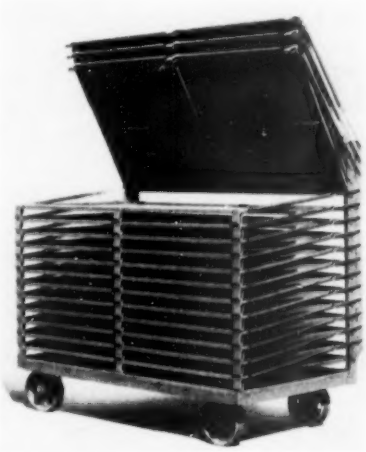
Four models of the press are available—capacities 300, 450, 600, and 1000 tons.

Imported by Rahway Machine Tool Corporation, 1539 Elizabeth Ave West, Linden, NJ

Tube Test Fixture Checks Four Assemblies Simultaneously

Fauver tube test fixture provides for checking four tube assemblies at the same time. Cycle consists of loading the assemblies and clamping them in position, lowering fixture into water tank, admitting air into tubes under 80- to 100-lb pressure, and detecting leaks by observing bubbles in the water. Equipment includes stand, tank, Cuno filter, Norgren regulator, and Parker fittings.

J N Fauver Co, Inc, 49 W Hancock, Detroit 1, Mich



Rack For Separating Or Drying Sheets

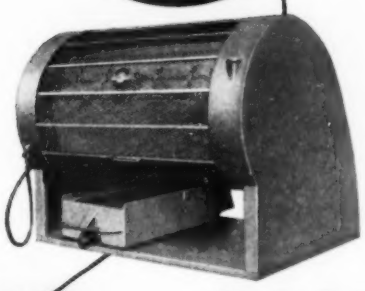
Rack was made for use by manufacturers for drying or curing sheets or material, or where parts must be separate. Shelves can be raised or lowered and are automatically held in position by extension springs.

Palmer-Shile, 16003 Fullerton, Detroit 27, Mich

Come to TUMBLE GRAV-I-FLO FINISH for ALL your tumbling needs!

You can get complete equipment and supplies for faster, better tumbling at Grav-i-Flo. This authoritative tumbling source can furnish you, from its years of experience, the correct answer to any tumbling problem.

Larger capacity machines take 31% to 80% more work-load in same floor space. Improved cutting materials shorten cutting cycle by 15% to 25%. Grav-i-Flo installations substantially reduce capital investment, floor space, and production time!



Model 66″, two compartments

MACHINES

Model 48″, two compartments

Grav-i-Flo 66″, 48″ and 36″ machines have cam locked doors with manually released safety stops; available with unlined or rubber lined cylinders, constant or variable speed drive, J.I.C. controls, and timers from 5 minute to 20 hour cycles. Equipped with electric wiring and water piping installed ready for plant hook up.

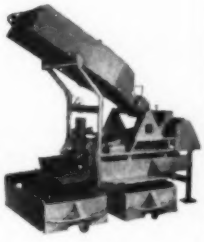
Model 36″, two compartments

Model 24″, two compartments

Designed For Small Lot Production and Laboratory Processing.

ACCESSORIES

Two deck parts-and-chips separator and chip grader



Occupies less floor space. Separates parts quickly without impingements. Grades 3 sizes of chips simultaneously.

Other Grav-i-Flo accessories include tubular yoke hoist pans, chip pans, wash-out doors, screens, chip bins, unloading boots, dip tanks.

Chips and compounds

Grav-i-Flo natural and synthetic deburring and finishing chips and highly developed compounds consistently outperform every type of tumbling process offered on the market.

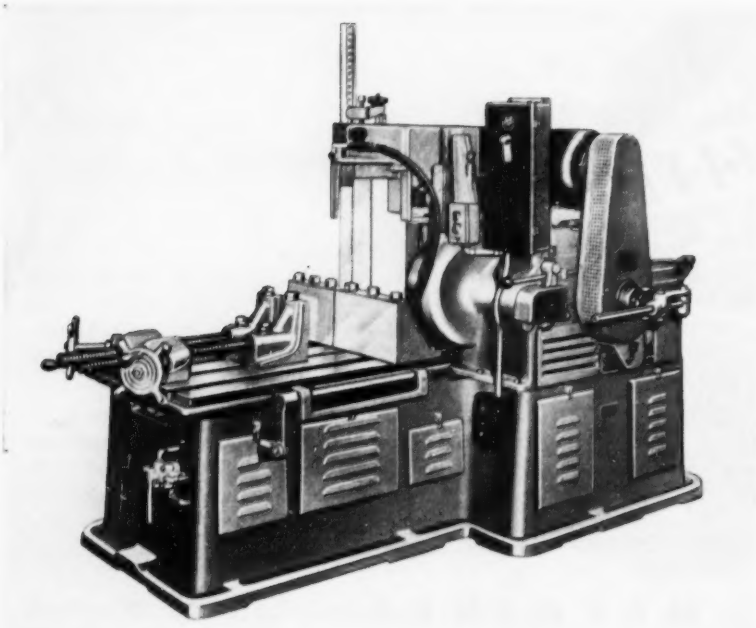
Investigate!

Grav-i-Flo superiority in equipment and supplies has been proved to hundreds of users in many different industries. Let us show you, too, at no obligation. Our representative will visit your plant, or send samples direct to us. Engineering Service available to all users.

SEND FOR CATALOG showing complete line of Grav-i-Flo equipment, accessories and supplies.

THE GRAV-I-FLO CORPORATION

Dept. AM-7, 400 Norwood Avenue
STURGIS, MICHIGAN



Peerless Redesigns Vertical Hydraulic Hacksaw Machine

Peerless 18x19-in. vertical extra-heavy-duty hydraulic hacksaw machine has been redesigned for performance improvement. Changes include a larger hydraulic pump, improved feed piston and piston ring design, and timing of the cam.

Vertically operating sawblade has larger lift on relief stroke. An air cylinder counterbalances the weight of the reciprocating frame.

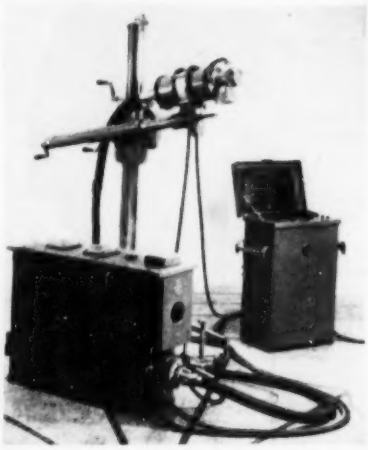
Peerless Machine Co, 1600 Junction Ave, Racine, Wis

Electric Metal-Cutting Handsaw

Baier electric metal-cutting handsaw has been introduced to American market by Alina Corp. Saw uses a high-alloy-steel blade and is capable of cutting 2- or 3-in. bar stock depending on size of saw used.

A 1/3-hp motor, operating on 110/220-v, dc or ac current, powers the saw; model operating on air pressure is also available. Unit weighs 17 lb.

Imported by Alina Corp, 401 Broadway, New York 13, NY



Radiography Equipment Designed Specifically for Industrial Use

Norelco industrial X-ray radiography equipment for 150 KvP and 300 KvP applications has been specifically designed for industry to meet all requirements of radiographic and fluoroscopic examinations. The smaller unit will penetrate 2 in. of steel and consists of the generator, control cabinet, tube, and handling device. The larger unit will penetrate 4 in. of steel and consists of two generators, control cabinet, tube, tubestand, and oil pump.

Any one of four x-ray tubes, depending on application, can be chosen for use with the 150 KvP unit. The 300 KvP tube is said to be well adapted for work where heavy objects, such as boiler drums, welds, and steel castings, must be penetrated.

The control cabinet houses all controls and regulators and on it are mounted the instruments which indicate line voltage, milliamps and x-ray tube kilovolts. A special feature permits pre-indication of the high voltage required as well as the measurement of true tube voltage during operation, regardless of tube current.

Power supply for both the 150 KvP and 300 KvP installations can be either 220 or 380 v ac, 50-60 c. Current consumption is 11 amp for the 50 KvP unit and 20 amp for the 300 KvP unit.

X-ray Div, North American Philips Co, Inc, 750 So Fulton Ave, Mt Vernon, NY

Pereco Furnace Attains 5000 F in Two Hours

Pereco Model CT-312 carbon resistor-type furnace for ultra-high-temperature work in the formation, fabrication, or processing of ceramic or refractory materials is reported to be capable of reaching 5000 F in approximately two hours. Even-temperature zone of the tube furnace is 12x3 in. ID with a full heated length of 26 in.

Elements are water-cooled and said to be completely protected with fail-safe electrical interlocks. Furnace is automatically shut down in event of water-flow failure to either the transformer or electrodes, or both.

Unit may be equipped with either ignitron-thyratron power supply or saturable reactor capable of supplying power continuously variable from 1 to 100% of connected load. Provided with pushrod ports, unit permits either continuous or in-place firing on predetermined schedules.

All-welded steel furnace is 23 in. wide, 60 in. high, and 41 in. long.

Pereny Equipment Co, Columbus, Ohio

ARO AIR TOOLS MEAN *faster assembly* for DOUGLAS AIRCRAFT

LONG BEACH DIVISION

DRILLING—Mr. Kenneth Hall, Tool Engineer at Douglas, Long Beach, inspects operation of Aro Right Angle Drill for close-corner work.

DRILLING—Aro Aircraft Drills speed production . . . models range from 500 to 17,000 R.P.M.

SANDING—Aro Vertical Sander smooths weld seams rapidly. High power in proportion to weight.

These are typical of hundreds of assembly jobs performed by ARO Air Tools in the Douglas Aircraft plant at Long Beach, Calif.—to meet demands for *high speed, efficient* production!

Do you have similar production problems in screwdriving, nutsetting, grinding, sanding, drilling, mixing, etc.? An ARO Field Engineer will gladly help in engineering your job or *contact your Aro distributor.*

The Aro Equipment Corporation, Bryan, Ohio

Offices in All Principal Cities

In Canada: Aro Equipment of Canada, Ltd., Toronto, Ont.

GRINDING—Aro Short Grinder widely used in aircraft assembly work.

ARO AIR TOOLS

Also . . . LUBE EQUIPMENT . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS

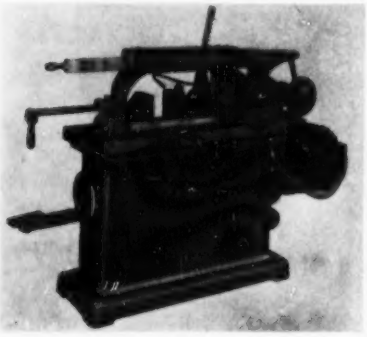
Heliarc Torch Arc-Welds Continuously at 500 amp

Heliarc HW-12 continuous, heavy-duty, inert-gas, arc-welding torch operates at 500 amp by virtue of an improved water-cooling method. Cooling water flows into torch body and down around water jacket housing the gas cup; return flow leaves torch body through plastic hose housing the power cable.

Quick-release collets are another feature of the torch. Quarter-turn of the torch cap releases electrode for replacement; electrode adjustments are made through the torch cap. Entire torch body is sheathed in heat-resistant plastic.

Standard ¼-in. and ⅛-in. collet bodies are furnished to hold collets ranging from 0.040 to ⅛ in. and ⅛ to ¼ in. respectively. Two torch caps are included, permitting the use of either 3- or 7-in. electrodes.

Linde Air Products Co, 30 E 42nd St, New York 17, NY



Keller Adds 7x7-in. Capacity Power Hack Saw to Line

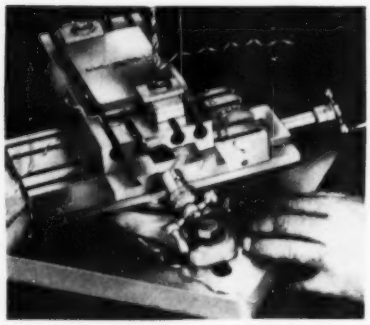
Keller No. 4 Hy-Duty power hack saw has a capacity up to 7x7 in. Quick-acting swivel-base vise operates to 45° and has capacity of 4x7 in. at that angle.

Variable power pressure regulator provides blade pressure from 0 to 200 lb. This reportedly greatly increases the efficiency for cutting materials from lightest wall tubing to heavy shafting.

Adjustable footlift helps hold saw frame in position while loading or unloading saw, enabling operator to use both hands for setting and starting saw. Model has automatic lift on reverse stroke, adjustable bronze bearings for guide bar, built-in coolant tank and pump, and is equipped with Oilite bearings.

Two speeds of 80 or 140 strokes per minute are available by shifting belts. Standard equipment includes automatic stop switch and belt take-up.

Sales Service Machine Tool Co, 2363 University Ave, St Paul 14, Minn



South Bend Lathe Universal Table

Universal Table is said to be an ideal accessory for combination angular and straight line cuts on shapers, milling machines, and grinders. When used on a drillpress, it spaces drilled holes and by chucking an end mill, the drillpress converts to a light milling machine. By attaching the table to the face plate of a lathe, spaced holes for jigs and die blocks can be bored with micrometer accuracy.

The upper and lower tables are identical, and the upper table can be removed when not needed. Both upper and lower slides have a max travel of 4 in. and revolve through 360° on graduated swivels.

Two feed screws are equipped with micrometer collars reading in thousandths of an inch. Measuring 4x8⅞ in., each precision-ground worktable has four slots for clamp bolts. Full-length take-up gibs on the dovetails insure accuracy.

South Bend Lathe, South Bend 22, Indiana

Portable X-Ray Unit Penetrates 4-in. Steel

Andrex 250 kVp industrial x-ray unit eliminates high-tension cables, cooling connections, separate transformers and cooling pumps. X-ray tube and other high-tension parts are combined in the all-welded steel tank.

Unit will penetrate 4 in. of steel. Focal spot is 4 mm; at focus-film distance of 24 in., 17-in. film is covered.

Supply voltages are 110, 220, or 440. Weight is less than 350 lb.

Andrex unit is reportedly only one made to operate on 110 v.

Holger Andreasen, Inc, 703 Market St, San Francisco, Calif

Key-Type Hydraulic Cylinder

Key-type hydraulic cylinder has long Meehanite-rod bearing providing full surface for longer wear. Chevron-type packing is said to be easily replaced and whole bearing insert is held by locking snap-ring at rod end.

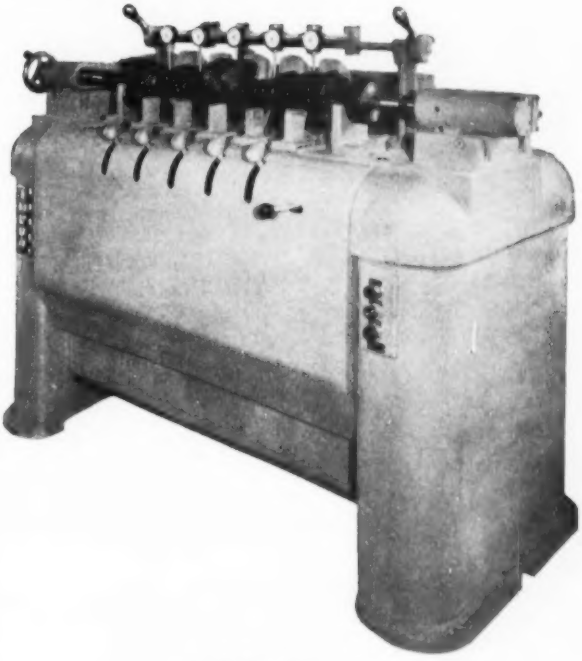
Cast steel mounts are standard equipment and an integral part of the head and rod caps of the cylinder. Head and mount combinations are disassembled by removing internal-locking-key ring uniting the head and cylinder wall. No bolts are used.

Carter Controls, Inc, 2912 Bernice Rd, Lansing, Ill

Impco Straighteners

Tailor-Made and Precision-Built For

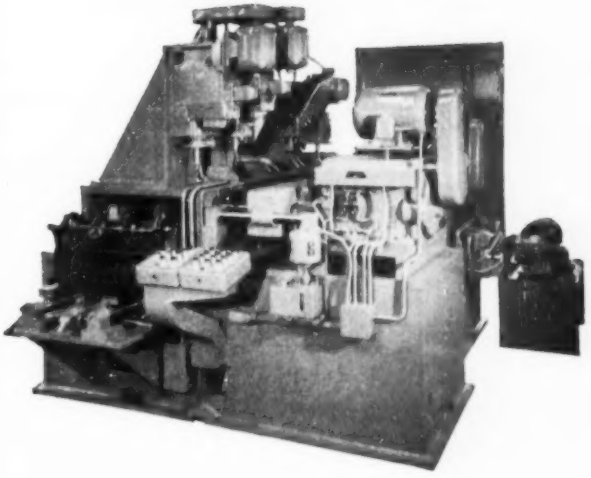
- **CRANKSHAFTS**
- **AXLE SHAFTS**
- **CAM SHAFTS**
- **ROCKER ARM SHAFTS**
- **TRANSMISSION SHAFTS**
- **OTHER PARTS OF THIS TYPE**



IMPCO Shaft Straighteners incorporate a new principle which straightens shafts by pulling downward instead of pressing the point of runout. A battery of dial indicators makes it possible to locate IMMEDIATELY the amount of greatest runout. These indicators, which can be mounted on a common swivel bracket or on anvils with ample over-travel, are so located that they will not be harmed by loading or straightening of the part.

ALL IMPCO Straighteners are driven by means of a hydraulic double vane rotary cylinder. A convenient filler and large cleanout for the hydraulic oil tank are located on the back side of the machine. Moving parts are encased below the working surface for greater safety and compactness. Tailor-made to customer specifications, IMPCO Straighteners are designed to meet special production needs with consistent accuracy, speed, and efficiency.

CUSTOM-BUILT MACHINES to Fit Your Needs



This automatic transfer machine used for drilling, tapping, and trepanning, was built to specification for a leading automobile manufacturer. It handles 60 cylinder blocks per hour net. We offer it as one example of how IMPCO can solve a particular machine problem. Remember, IMPCO will design plans for you, work from your own prepared specifications, or modify existing machines to meet your specific needs.

For Further Information
Contact Your Nearest Sales Representative
Or Write Direct to Company

Joseph O. Gangler Company
22750 Woodward Avenue—Room 305
Ferndale, Michigan

Stong Carlisle & Hammond Co.
1392 West 3rd Street
Cleveland 13, Ohio

1200 Madison Avenue
Toledo 2, Ohio

Ernest, Holdeman & Collet, Inc.
2254 College
Indianapolis 5, Indiana

J. A. Jyleen
Machinery Sales
Clarkston, Michigan

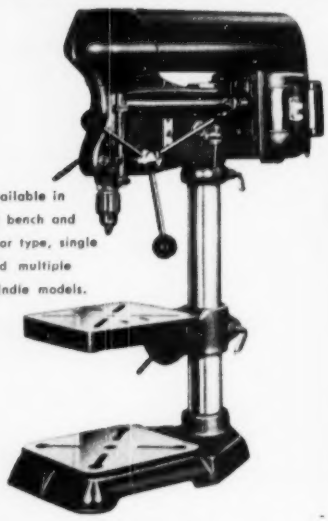
Dawson-Rhoades Thibodeau Machinery Co., Ltd.
149 Main Street, E.
Hamiltor., Ontario
Canada

Box 373
General Post Office
Montreal, Quebec, Can.

impco **INDUSTRIAL METAL PRODUCTS CORP.**
P. O. Box 156 **Lansing 1, Mich.**

famco

15" DRILL PRESSES



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Barnstead Still & Sterilizer Co, 132 Lanesville Terrace, Forest Hills, Boston, Mass

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Hypro Engineering, Inc, 404 N Washington Ave, Minneapolis, Minn

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General Electric Co, Fitchburg, Mass

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Riverside Manufacturing & Electrical Supply Co, 10228 Michigan Ave, Dearborn, Mich

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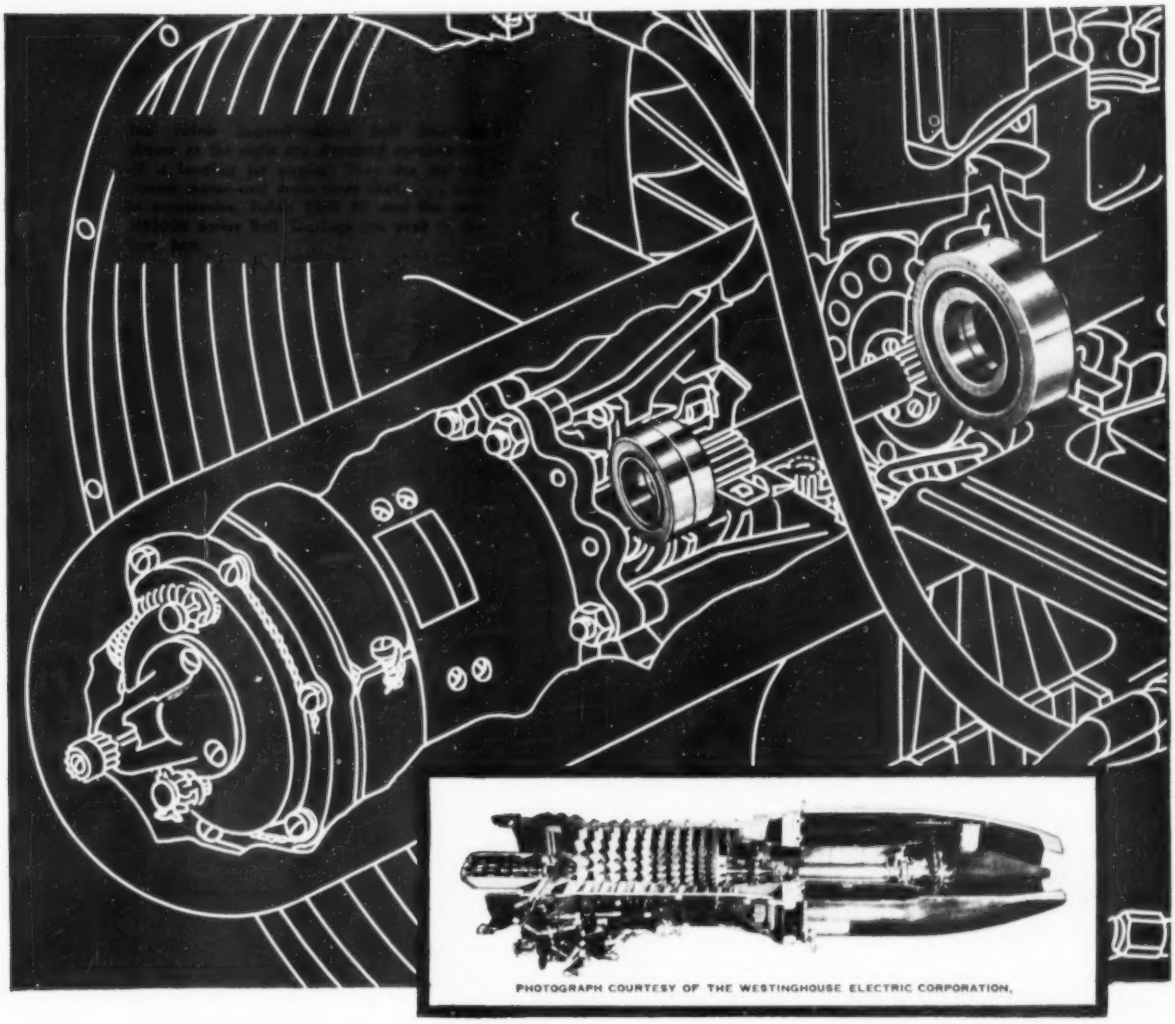
Van Straaten Chemical Co, 546 W Washington Blvd, Chicago, Ill



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Torrington Swaging Machines offer a means of reducing rod, wire and tubing that improves the quality of the material, gives a better surface, without waste of stock. Hammer blows (4000 a minute) speed production, and give the metal toughness and resiliency that cannot be obtained by any other method.

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Electrolized gages added to the Taft-Peirce line are said to have much longer life than ordinary hardened steel gages due to even film of hard, non-magnetic alloy applied to surfaces during electrolizing process. Coating, only 0.000025 in. thick, imparts a tough surface much harder than tool steel. Smooth surfaces reduce friction and are highly corrosion-resistant.

The Taft-Peirce Manufacturing Co, Woonsocket, RI

Jet-Pak VCI-lined cushioned bags are said to protect metal parts from rusting and corrosion up to 10 years. Cushioning, sealed within double walls of moisture-resistant kraft, safeguards product from rough handling, dampness, and damage in transit. VCI lining blankets metals with an invisible, dry vapor which penetrates blind holes and cavities. Reusable bags are available in 7 stock sizes.

Jet-Pak, Inc, 859-879 Summer Ave, Newark, NJ

Tee nuts mass-produced in 15 sizes to fit every machine tool application have been designed to eliminate custom toolroom machining. Throat sizes available from 7/16 to 1⅛ in., machined of heat-treated alloy steel with 200,000-psi tensile strength.

Jergens Tool Specialty Co, 712 E 163rd St, Cleveland, Ohio

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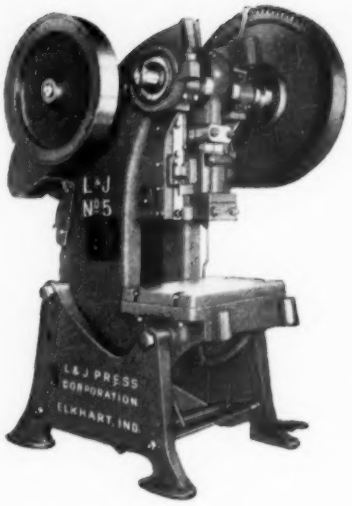
Inland Automatic, Inc, 1108 Jackson St, Omaha, Neb

DTR's straight-periphery diamond wheels are being supplied with a new backing with high aluminum powder content for added heat conductivity. Ten-inch-diameter wheels are said to run absolutely true without uneven distortion from harmonic vibrations.

Diamond Tool Research Co, 305 E 45th St, New York, NY

Two fittings have been added to the Swagelok line; cap, used for capping end of the tube, and plug, for plugging unused port of fitting. Both are furnished completely assembled in variety of sizes, from ⅛ in. up.

Crawford Fitting Co, 884 E 140th St, Cleveland, Ohio



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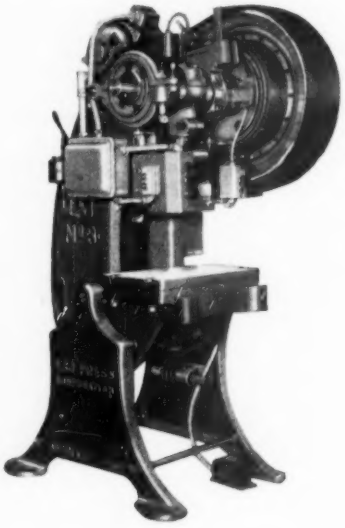

ROUND TABLE Discussion

TRUE CONFESSIONS

Should the executive always act as if he's right—and knows the answers? Can he afford to let somebody prove him wrong? Is his "feet of clay" or his cracked pedestal a sign of weakness—or of strength? Say some readers . . .

SOMEONE ONCE said, "If you want enemies, excel your friends; but if you want friends, let them excel you." This is more or less true with employees. They are resentful of the boss who thinks he knows all the answers. They do respect the boss who asks for help and suggestions.

The employees also respect the boss who admits his own mistakes. We are not supermen who can solve every problem in engineering and human relationships without help. To establish a satisfactory relationship between line and staff we must serve others, but at the same time find opportunities to have them serve us. This promotes teamwork, and a feeling of belonging and togetherness.

When you ask an employee for help you pay him a compliment. It gives him a feeling of importance. The boss who shows respect for the other fellow's opinion usually gets out quality production. No executive will lose prestige by asking for help.

It is essential to the common interest of boss and worker to share ideas; the profits of the business support them both. Willing workers are the biggest single factor in getting out production. Let the worker share in the discovery of facts.

A E Salmons
Philadelphia, Pa.

IT IS MOST essential that the foreman maintain his technical prestige at the highest possible pitch. If he goes around the shop quizzing his subordinates for technical tips he is sure to go down a peg in their estimation. There are other ways of settling technical problems without the foreman flaunting his ignorance so that all and sundry may jeer.

The Golden Rule for all foremen who suffer from technical or administrative blind spots is "Thou

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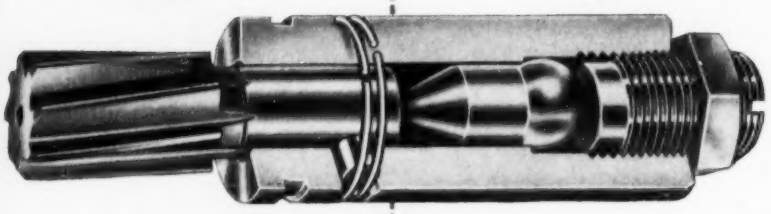

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shalt not be found out." On the other hand, the foreman should have a private rule for his own use—"Thou shalt find out for thyself damn quick!" All foremen should try to make their prestige with their workmen unassailable and one way to do this is accomplished by not letting anyone get the goods on him; he must not provide any ammunition for snipers, who are found in every shop.

A big weakness of many foremen is the way in which they try to be omniscient when they have nothing solid behind them in the way of technical ability. They try to do everything themselves and discourage criticism or advice. It is quite possible for a foreman to preserve an illusion of being an oracle while at the same time welcoming ideas from the men in the shop. This requires very adroit applied psychology but it can be done, provided the man knows how to forget his all-consuming vanity when the need arises.

One way in which the vain foreman damages his own position with the workmen is to neglect to use the proper administrative machinery which exists for settling technical problems. In nine cases out of ten, if a tool or jig fails to work properly the problem should be dropped into the lap of the tool designer. He has conceived the original idea, put it on paper, taken care of every possible difficulty likely to arise and he should know the tool better than anyone else. Yet we still have foremen who wrestle with tools that will not work and are too vain to get together with the man who first designed them. This practice is infuriating for everybody; the foreman is not in control of his department while doing the work of a

"You haven't even noticed my new overalls."

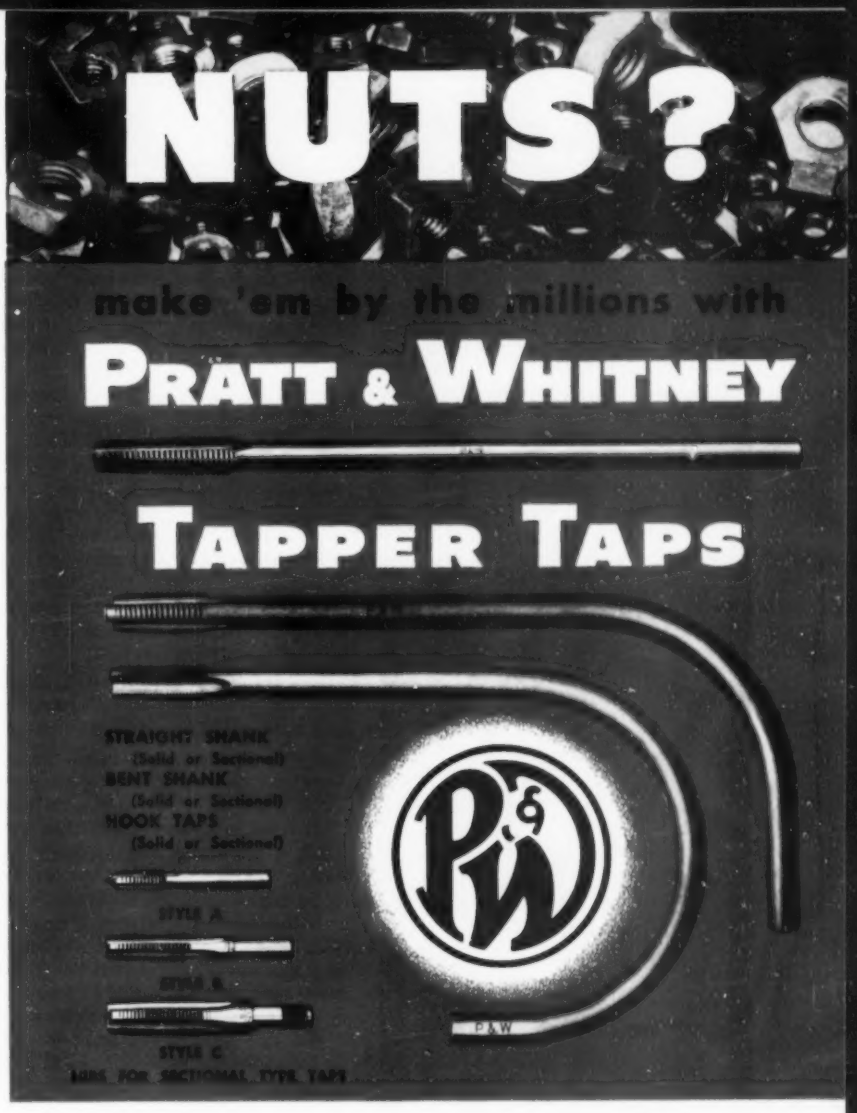
mechanic. The tool designer, very possibly, has a simple solution to the problem and would welcome a query about his brain-child. I have seen carefully designed tools modified in the shop at the behest of the foreman without any consultation with the draftsman who designed them. Had the designer been consulted, he could have supplied a missing piece of information that would have made modifications unnecessary.

One modern theory is that foremen should be picked primarily for their administrative ability, with technical knowledge taking second place. This method has been found to work mainly because of the subdivision of both labor and responsibility which has developed in modern plants. Any foreman who insists on trying to be chief designer and everything else is biting off more than he can chew and is headed for trouble. On the other hand, he should keep up-to-date with the plant, processes, and organization with which he is concerned. Top management should provide facilities and should encourage their foremen to keep their knowledge up to the mark. A library should be organized, inter-departmental consultation should be fostered, clear demarcation of channels of responsibility should be indicated so that the foreman will have the answers to any technical problem likely to arise readily available to him.

A firm which operates a suggestion scheme enables a foreman to accept hints and tips from the workmen without losing stature. Since the suggestion scheme is company policy and is controlled by top management, the foreman is not in any position to refuse gratuitous advice no matter how vain he may be. If he won't take a suggestion personally, the workman can always go over the foreman's head and drop his hint into the suggestion box.

Keeping up the prestige of foremen is of course very important in any

"Benson, have you found out yet who dropped that suggestion in the box back in May?"



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plant. If the firm is tightly organized with correct procedures laid down for coping with all possible difficulties, the responsibilities resting on the shoulders of the foreman are reduced. Some plants are so well organized that the foreman is merely called upon to administer a set of laws or rules which are laid down for his use and guidance. His prestige will depend largley upon the way in which he interprets the law, but the possibilities of his losing face in the eyes of his men are reduced greatly.

In small shops where the foreman is expected to be a walking technical encyclopedia in addition to being as wise as Solomon, the maintenance of prestige and dignity of the foreman is of vital importance. If this is of high standing, the internal discipline and smooth working of the shop will be assured.

Clifford T Bower
London, England

DO WORKERS ACTUALLY think that the boss has to know all the answers? Or is it the ego of certain individuals that tries to make it seem that way? Isn't it generally the foreman who takes this attitude? Or do we find it in higher management circles?

In making an analysis of this subject, it is found that generally speaking the lower the supervisory position, the more apt we are to find the attitude of always having to be right and having the answer. This is based on the fact that usually our lower supervision is taken from the rank and file of workers. They are told that because they know the answers and appear to have some ability of leadership, they are now being made a foreman. Here their training all too often stops. The company forgets them. Their super-

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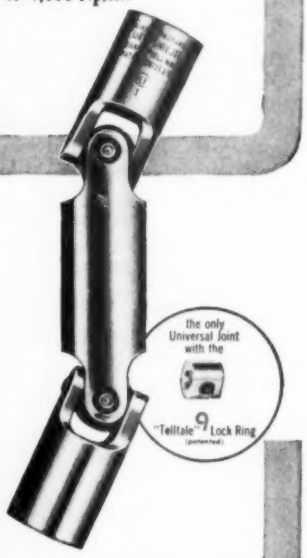

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visor has too many other problems of protecting his own job and neglects to give better training to the foreman. The foreman struggles along, building up his prestige on the ill-advised fact that he must know all the answers. The workers soon become aware of his shamming and he is in trouble. Since the foreman feels that he can not call on his workers for help, and knowing that little or no help will be forthcoming from his supervision, he becomes lost. Perhaps he finally gives up or maybe he eventually sees the light, breaks down, and admits to his workers that the job is licking him.

Generally speaking, the most successful foreman is he who has his workers helping to solve his problems for him. The foreman then can do the proper work of administration of company policy. To admit one doesn't know is indeed difficult . . . particularly if you have personally bragged or have tried to impress your workers of how much more important you are than they. Yet the best thing possible for a foreman to do when he is in Ed's fix, is to admit he needs a little help in solving the problem.

Industrial management could improve the life of the foreman if each company would only set up a constructive, forceful, educational program for all its foreman. Training on the job is always necessary for those who do not know the many problems that confront them in regard to handling people, knowledge of company policy, and the general facts of company or business operation.

So if you are a foreman and know that you have several weaknesses, first try to learn about your job. Then when problems in the shop come up which are mechanical in nature, talk it over with your best workers. Make them part of the company and also get the job done.

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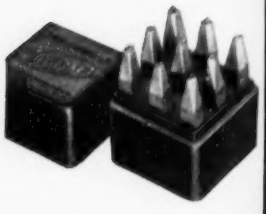

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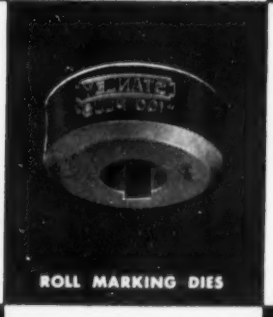

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by Parker

After all, your boss only sees you. If you fail because you are stubborn and won't accept help, then don't blame the company. Ask your personnel director to help yourself through planned courses of foremanship.

Charles D Townsend
West Hartford, Conn.

•

RUSTY

Does a man lose touch—become rusty—away from his trade? Should you hire back an ex-toolmaker who hasn't been at the job for the last ten years? Here's what readers think . . .

WHETHER A MAN can come back to his trade after a ten-year vacation depends a lot on what he did during that period. If he lost all contact he will find it hard to get back in the groove.

His attitude toward his job might be entirely different than when he was a young, eager beaver trying to learn all that is necessary to the trade. His reflexes will not be receptive to the faster tempo of today's methods. If he continued to read technical publications or met with some of his friends who stayed at the trade at regular intervals, he could possibly get back in the swing in a short time. If he was only a mediocre toolmaker, it would take quite a long time to pick up where he left off during his initial training.

When a man takes a position higher up in the line, then returns to his original trade, he might present a psychological problem. If he previously held a supervisory position it might be awkward for him to take orders again. He might also be critical of his present foreman's judg-

"This party line is terrific—I just heard you stopped for a glass of beer on your way home!"

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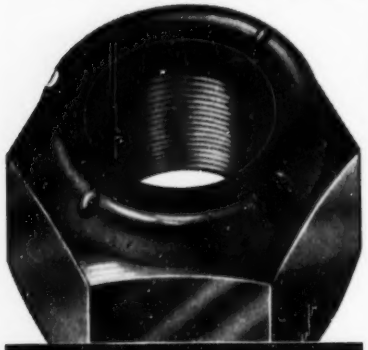


GREER
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF
Stop Nuts

ment or policies and create an unpleasant situation.

It shouldn't take the foreman long to find out whether he had a genius or a lemon on his hands. With today's labor situation, the foreman hasn't much of a choice and would probably give the man a chance and find something in the shop that the man could handle.

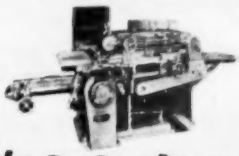
Frank J Zarnowski
Rutherford, NJ

TO TURN a toolmaker down for no other reason than that he has not been working at the job for ten years is possibly a quick and easy way to miss a good man and discover later that he has proven a valuable addition to a competitor's staff.

I had an excellent toolmaker quit to take charge of a small monument works. This seemed like going the wrong way, but the man could not help himself; it was his father's business and his father had had a stroke. He was away four years and when we got him back he was much more valuable than before because he had learned the value of speed as second to accuracy. He also realized that a company must make a profit if it is to continue in business and so he figured many short cuts to get jobs out within the estimated time.

Of course, if a toolmaker has quit his job to become an insurance agent, or something like that, and then ten years later tried to get back in the shop, his value could well be questioned, for not only has he lost ten years in experience valuable to a toolmaker, but he has gained nothing to increase his value to the shop. On the other hand, if he quit to become a tool designer, or foreman of a tool and die shop or, better still, if he tried to run a small tool and die shop himself and got a living out of it for ten years before he decided he did not have the capital to make a success of the venture, then he would most probably prove to be a valuable

"Here comes another rush order from the boss."



"WE RECOMMEND THIS LUBRICANT TO OUR CUSTOMERS"

—says PACKAGE MACHINERY COMPANY
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"We have found LUBRIPLATE Lubricants to be very effective and use them extensively in our machines. To assure the proper use of LUBRIPLATE Lubricants for re-lubrication, we place tags on our machines before shipment. Thus the purchasers of those machines know the LUBRIPLATE Product we recommend for each application and where to obtain it."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

man. He now would have a much broader idea of the many factors involved in the successful operation of a toolmaking department.

There was the toolmaker who retired at 60 and lived comfortably for six years when his wife became very sick and the hospital and medical bills took about everything he owned. He explained his situation to the personnel manager of a large tool and die concern and was promptly hired in spite of the fact that he was over 65. He soon proved to be most valuable to them and within a year was moved into the front office as a consultant on production equipment for sheet steel articles. His vast experience in this line gave him knowledge and assurance as to the correct working of steel sheet strip and the equipment he sketched, when built and put into operation, gave complete satisfaction—a situation most tool and die concerns would consider almost perfection.

Be careful that you know all the facts before you turn a man down because he is, in your opinion, "an old-timer and worn out."

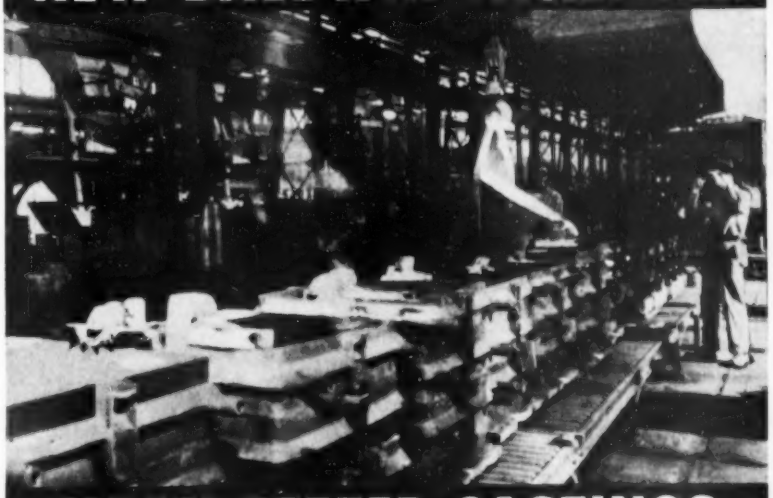
George P Pearce
Albuquerque, NM

A FELLOW GETS rusty when he is not working on a project day in and day out that uses all of his talents; so does a piece of machinery. But the machinery can be cleaned up and re-painted to look like new. A worker who has learned a trade or some special art never forgets the fundamental principles of the business. He may not remember all of the short cuts he knew when working at it constantly, yet they, too, return as he arranges to start in again on the job.

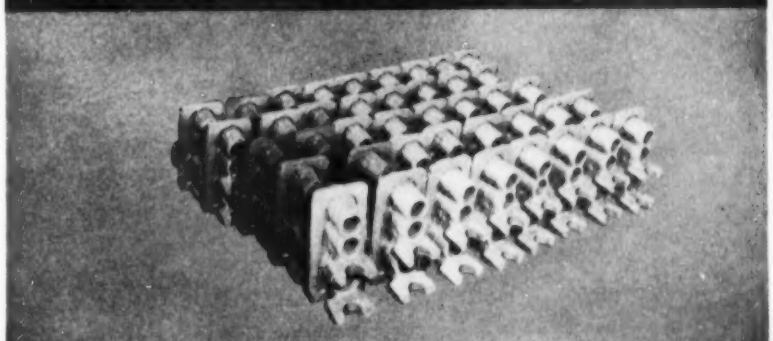
It is strange that people take to the

"After eight hours of this, she expects me to help with the dishes!"

NEW BALDWIN FACILITIES



MEAN BETTER CASTINGS



AND FASTER DELIVERIES

Now you can save two ways by making Baldwin your regular source for iron and brass castings . . . large or small:

1. You can speed up your production schedules because Baldwin has speeded up casting deliveries 220%. New automatic sand mixing and handling equipment and rearrangement of the pouring operations have enabled Baldwin to increase foundry capacity and at the same time lower casting prices as much as 30%.

2. Baldwin is now able to produce even finer quality castings which cost you much less to finish. This high quality is assured by the uniform machine packed molds, engineered gates and risers, and better control of pouring temperatures. (Note in the upper photo how the molds are arranged so that one tap can be used up before the temperature falls appreciably.)

You, too, can get *quick* deliveries on castings as clean and smooth as the intricate diesel-engine valve guides in the lower photo. For details about the 110 brass and 20 iron alloys available, write Dept. 5702, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

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Saves $5000 per year using $225 DUMORE® AUTOMATIC DRILL HEAD

The Drill Head speeds and simplifies work on small, close precision parts such as a 1" long brass rocking shaft, a brass connecting link with a .0135" hole, or a 1/16" rod of high carbon steel with two No. 60 drill holes.

Precision parts manufacturer assures accurate, close tolerances with DUMORE Tools

THIS manufacturer produces small aircraft instrument parts frequently requiring tolerances measured in ten thousandths of an inch. To handle small hole drilling in materials ranging from brass to high carbon stainless steel, a $225 DUMORE Automatic Drill Head was purchased.

Here's how it paid off: (1) In 500 hours' operation, the Drill Head tripled output, accounted for savings of $5000 in the cost of production alone. (2) It eliminated the need for premium skilled help as it is automatic, takes speed, feed, pressure and stroke out of the operator's hands. And (3) it has increased drill life by 400% or more!

As a company official put it, "We have found that this Drill Head will do things we have *never* been able to do with any other tool."

In these days of rising costs and a shrinking supply of skilled labor, can you afford not to check into the amazing advantages of DUMORE Tools? For details see your industrial distributor or write.

THE DUMORE COMPANY
1337 Seventeenth Street • Racine, Wisconsin

idea that if you are not doing the job now or haven't been for the last um-teen years that you can't be any good. If the basic information was learned in earlier days, then no matter how long it may be, one can re-learn to use the talent later.

Many people forget that even working at an art year in and year out, they also get rusty. Do they know all of the latest developments of their job? Do they definitely study all of the new ideas that come out, and try them? No, they are usually content in going along improving only as the boss demands it. Foremen are just the same. They, with few exceptions, never study how to be better foremen, how to handle personnel better or any of the subjects which would keep them up-to-date. Isn't that also growing rusty?

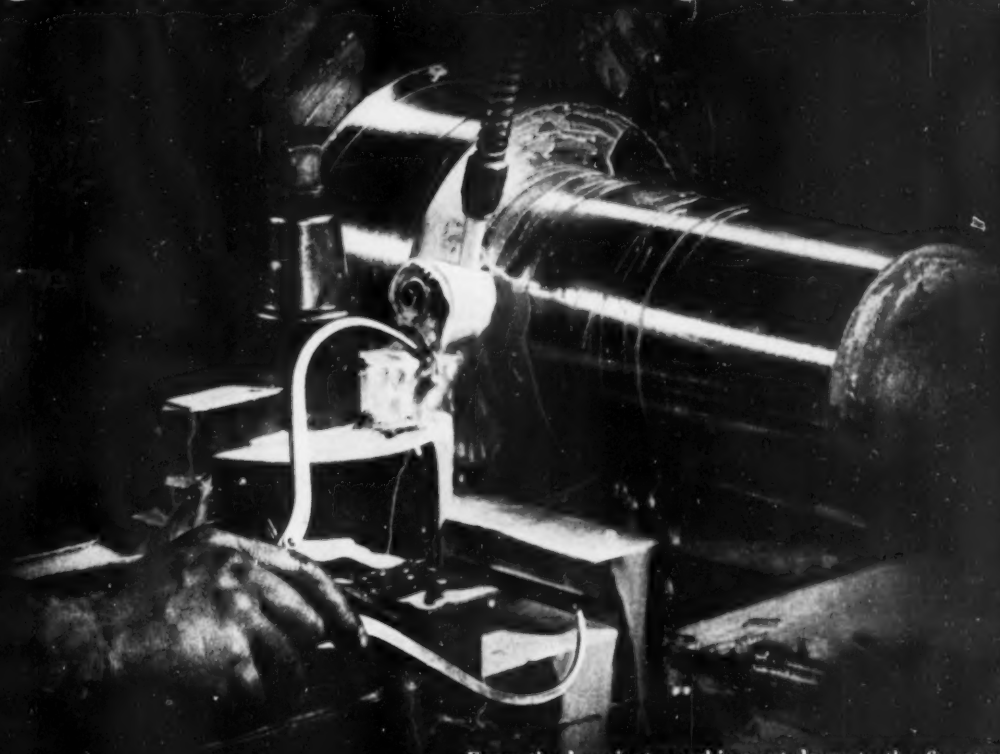
The fellow who has learned a trade the hard way, no matter how long he has been away, can pick it up quickly. He, perhaps, would surpass many who have been on the job for years because he starts with new conditions and studies the new techniques before he becomes adept again. He not only tries to recall old methods, but he tries new ways of doing things. He is not afraid he is going to learn something new. He is forced to learn—thus he makes a better worker.

We have been talking about the oldster who learned a trade and who for some reason gave it up and now wants to return to it. The same idea is prevalent with the man who learns several arts or accomplishments. He, too, gives up one to start another, thus he becomes classified as in this discussion.

It might be well for any foreman or supervisor to stop to think . . . how did I get to where I am today? Was it because I learned only one thing?

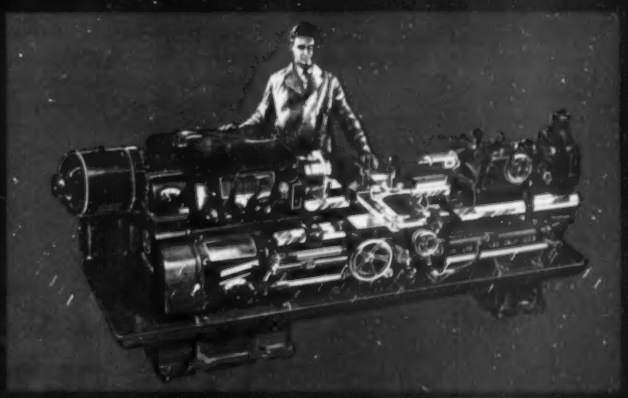
"The President's son got the idea from one of those ski tows."

Engineered for the tough jobs, too!



From the heaviest roughing cut down to the finest precision cut, Axelson lathes are designed and manufactured to give precise, accurate service. Critical dimensions "stay put" because each Axelson lathe part is produced under strict metallurgical control. Recording pyrometers keep continuous time and temperature records of hardening, tempering and normalizing operations on gears, spindles, shafts, lead screws, etc. Quality built, Axelson lathes are capable of delivering dependable, accurate work under the most difficult operating conditions.

Axelson manufactures heavy duty engine lathes in 16", 20", 25", and 32" sizes of various lengths; precision tool room lathes; a 20" medium duty engine lathe; gap lathes.



AXELSON Lathes

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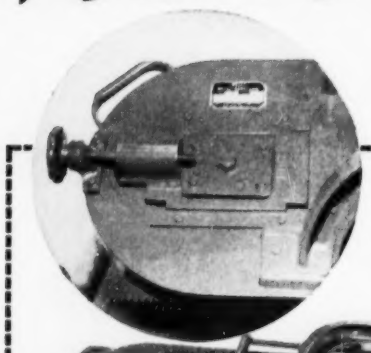
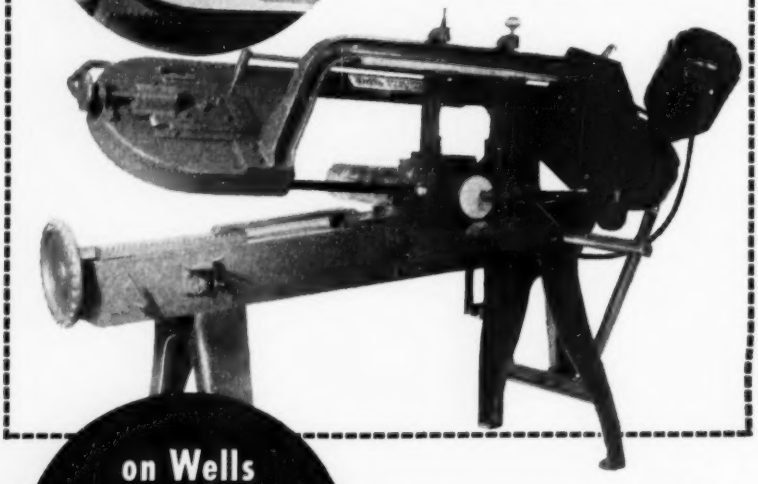
NOW Wells offers you fool-proof blade tensioning . . .



At left is a close-up of the new Wells blade tensioning device—simple, yet positive and fool-proof. Below is a Model 800 with blade tensioning.



on Wells No. 5, No. 8, No. 12 and Model 800 cut-off saws

NOW IT IS POSSIBLE to maintain a constant blade tension on Wells cut-off saws. You can replace or change the blade any number of times, yet quickly and easily duplicate the correct blade tension. The new device is standard equipment on the models listed above. Simply turn the tension hand wheel until the fixed and moving indices coincide. At this point the blade tension is correct regardless of a variation in the length of the blade.

The incorporation of this blade tensioning device into Wells Saws eliminates the guesswork in blade tensioning. It means longer blade life and better cutting. Only Wells Manufacturing Corp. offers you this remarkable advancement in horizontal metal cutting band saws.

Ask your Wells Distributor to give you full information, or write for descriptive literature.

CAPACITIES OF WELLS SAWS AVAILABLE WITH BLADE TENSIONING

MODEL	CAPACITY	
	Rectangular	Rd. Dia.
No. 5	5" x 10"	5"
No. 8	8" x 16"	8"
No. 12	12" x 16"	12¾"
800*	8" x 16"	8"

*Designed for 1" wide blades and approved for use with new high speed steel blade.

Wellsaws

Wells

The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT RD., THREE RIVERS, MICHIGAN

Or was it because I learned several things and practiced one and then another? Who gave me the breaks? Wasn't it the fellow above you who felt sure that because you knew a little about several things you'd be a success? Sure it was. Now when you have a tendency to say "No, the guy has been away from his trade too long" . . . just stop to think. Then say, "OK, because you have experience in other fields you certainly can learn your old trade over again more rapidly . . . go to it."

You can never keep a good man down. If you don't hire him, your competition will, and then you will find yourself in trouble.

Charles D Townsend
West Hartford, Conn

•

LAMBS OR GOATS?

Will company dinners and similar entertainment tend to bring workers and management into closer understanding, or will the men feel their after-hours are being invaded?

FROM MY OWN observation and experience I incline toward the opinion that company-sponsored entertainment of the type that Al suggests does very little to achieve good will beween employer and employed unless the groundwork for cooperation is laid in the shop. The instinctive distrust that Al talks about is certainly not going to be dissipated by any amount of suppers, no matter how elaborately planned they may be, because good will, like charity, begins at home—in this case, the shop.

So let's face it, Al; before spending the boss's money and your own time and effort, why not sit down and take a long, objective look at conditions in the shop. Are you satisfied that everything is being done to make it a comfortable place in which a man can do a day's work? Is it clean and well lighted; are there adequate washroom facilities and locker space where a man can store his outdoor clothes and personal belongings? For make no mistake about it, Al, a man's personal comfort is not a fringe benefit anymore, but an important selling point in keeping him happy in his job.

How about equipment? Are the machines in good shape, and is there a plentiful supply of small tools, such as drills, taps, reamers, and all the other incidentals that help a man to do a good job with the minimum of effort? It is assumed, of course, that your company pays the going rate for your section of the country

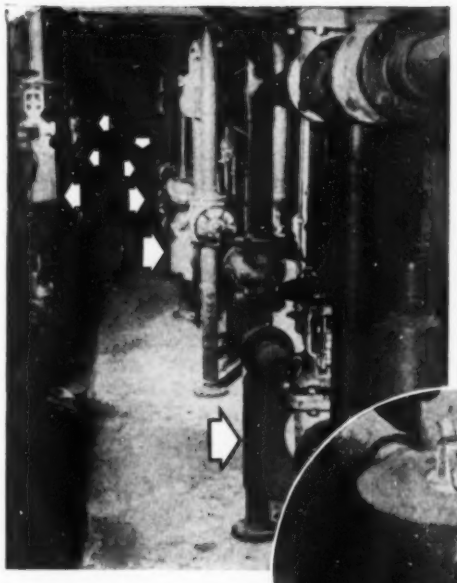
and that your men have a reasonable chance for advancement, if they have the required ability. If you can honestly say that these basic conditions exist in your shop, then you have gone a long way toward building a good employee relationship.

If there is a feeling of distrust after these basic conditions are established, then maybe, friend Al, it would be wise to take a long, objective look at yourself. Perhaps you have forgotten how it felt to work at the bench or lathe, and have developed a "they" complex, as did a certain individual with whom I was associated some years ago. Having come up the hard way, one would have supposed this fellow might have a soft spot in his heart for his less exalted brothers who were fated to wear overalls and punch a time clock. If he had such a soft spot, he kept it hidden under a good depth of case. When referring to the men in the shop it was usually in such terms as "What do they think this is—a blank blank rest home? They don't seem to realize we've got to get this stuff out." Or, "You gotta watch them or they'll put one over on you." There were several variations of the theme, all stressing the fact that "they" could not be trusted. Of course, this man's phobia did not make for a climate wherein good industrial relations could be expected to flourish. The labor turnover in that plant was terrific until the climax came with a long and bitter strike, and our friend was let go along with his ruinous philosophy.

This, of course, was an extreme case of the "they" complex, but it exists in varying degrees, and wherever it manifests itself there can be no close cooperation between management and men.

You certainly cannot expect to allay distrust by outside entertainment, particularly at company expense, if the employees have not

"Don't touch his tools; I think the box is booby-trapped."



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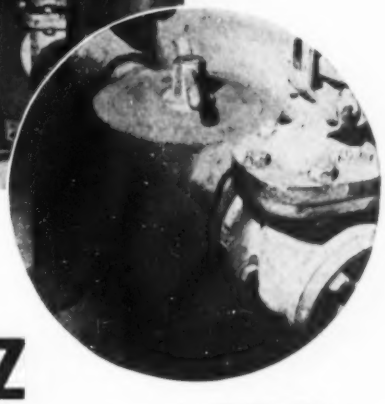

FRANTZ MAGNETIC SEPARATORS

help beat tool and machine wear, down-time, maintenance . . .

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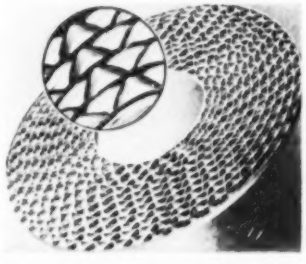

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Performance records prove the effectiveness of Frantz FerroFilters in removing abrasive ferrous particles from circulating oil and coolant lines. Here's what customers tell us! "Maintenance cut 90%" in gun drilling operations; "Cleaner threads, longer tap life," reports another; in grinding, "We get better finishes." And there are hundreds more who have solved production and maintenance headaches with Frantz FerroFilters.

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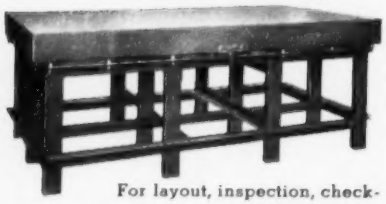

For layout, inspection, checking, lapping, assembly and welding operations . . . depend on the accuracy and stability of Challenge Precision Equipment. Mail coupon for information on Layout Surface Plates . . . Clamp Edge Layout Plates . . . Reading Tables . . . Lapping Plates . . . Welding Tables . . . Surface Plates . . . Bench Plates . . . Surface Plate Equipment.

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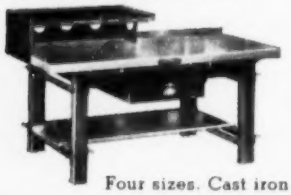

Four sizes. Cast iron top, two inches thick. Welded steel supports, tool box shelf, steel drawer with lock. ***Challenge Utility Benches*** — low cost.

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been accustomed to a feeling of good will in the shop in their dealings with management. No doubt the men will go along, the majority of them through curiosity and a certain sense of duty, together with the free loaders who are always among those present at such affairs. There will be polite conversation, and very little else.

Any form of paternalism, unless it is accompanied by a genuine and sincere effort to understand the motives and aspirations of the other fellow, is bound to be suspect. A foreman or superintendent who hasn't time for a pleasant word with people who work with him during business hours should not expect a cheery salutation on the outside.

One of the pleasantest things that ever happened to me occurred about a week after I started a new job as a young journeyman. I was bent over a lathe one morning when my new boss came up, tapped me on the shoulder and wished me a happy birthday. I found out later that he made a point of looking up the employment records and jotting down a man's birthday for the express purpose of wishing him many happy returns when the day came around. Genuinely interested in people, this man was never too busy to be friendly. We had entertainments once a month in that shop, little get-togethers that were paid for by the men chipping in so much a week; the foreman was also a dues-paying member. If the big boss or any of the higher ups cared to drop in, they were made welcome—it was that kind of a shop.

If there is any moral to this it must be the obvious fact that a little time and effort spent in getting to know one's fellowman can avoid a great deal of misunderstanding.

Robert S Alexander
Greenville, RI

"Gotta give you credit, Crepton—You're sure handy with tools."

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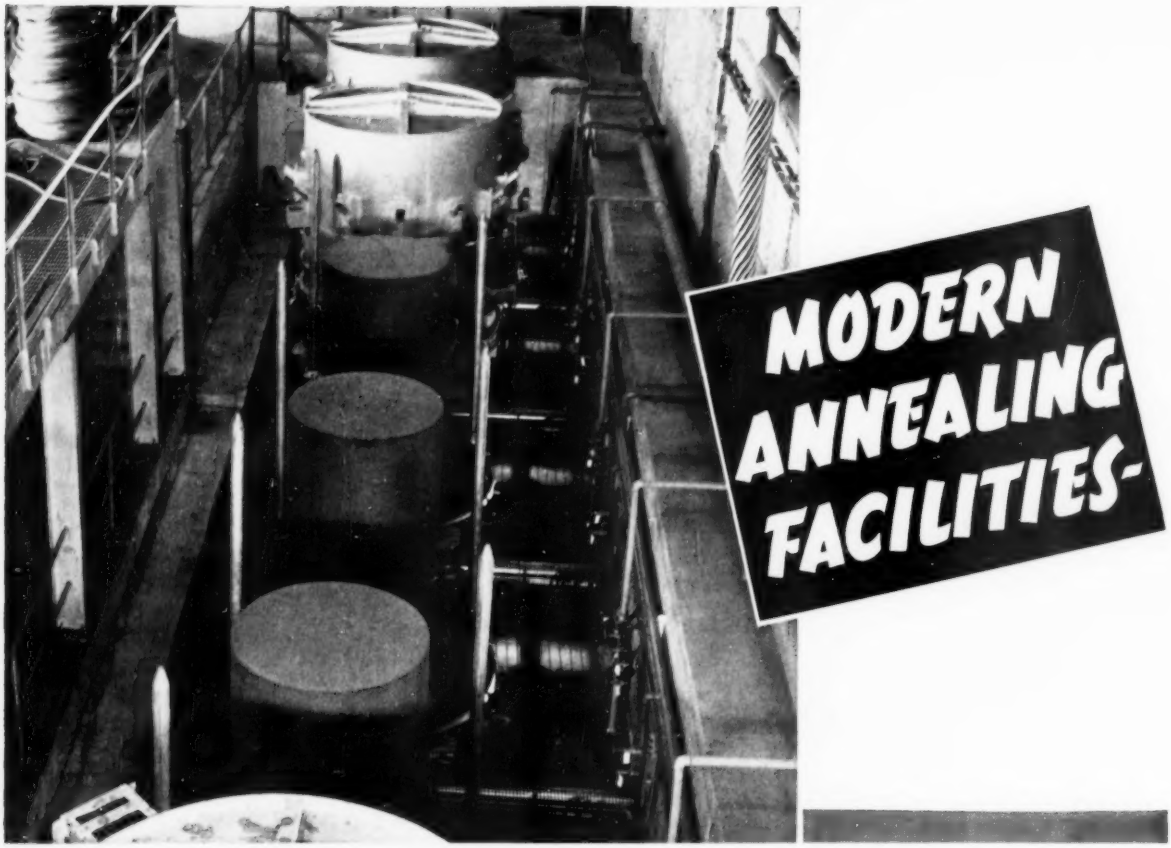

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Their machinability and cold working properties are superior. Tolerances, metallurgical characteristics and all phases of the manufacture of Youngstown Cold Finished Alloy Bars are subjected to rigid quality control of a single integrated organization—from mining of the ore to shipment of the finished product.

Youngstown Cold Finished Alloy and Carbon Steel Bars are furnished in standard shapes and sizes, in both coils and straight lengths. For further information, phone or write our nearest District Sales Office.

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JUNGLE LAW

How much responsibility has a foreman toward his company in the matter of lining up and training a successor, particularly if he is considering leaving the firm eventually?

THERE ARE a great many items to be considered before a man of foreman standing makes a change in his place of employment.

Some reasons for consideration are: is the prospective employer as well up in finances in the new place; what are the relations between the brass and the employees; do they have a great labor turnover, and if so, what causes it; will it be as pleasant a place to work in; is it farther from his home; are accommodations for foremen as good as they are in the present place; are there locker rooms and good sanitary facilities?

I recall one foreman who contemplated such a change. His employers heard of his notion, called him up to headquarters, and asked him if he could take on more work if they gave him more money. He said he could, and did, then proceeded to improve his part of the organization by getting better men as others quit, until he turned out more work than had ever been produced there. By such procedure he raised his chances, and when the firm built a new plant he was advanced to the position of an assistant superintendent. Evidently Al has given attention as to how often there are promotions in his plant and thinks they are like frog hair, few and far between. He appears to be a conscientious, orderly man, indicated by the fact that he has improved his department.

Circumstances usually govern the choice of a man for a replacement. A number of years ago a visitor was being shown through a well-known glass company. At a bench sat one of the oldest looking men he had ever seen at work; in fact the old man was bent almost double. There was a much younger man working next to him. The visitor turned to the manager and said, "I hope you

"We can be fastidious without overdoing it, Morgan!"

KELLER Air Tools

for high speed assembly

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KELLER *Air Tools engineered to industry*

Wherever parts are assembled with screws, nuts, bolts or rivets, the use of Keller Tools speeds up production, reduces costs, and makes work easier.

For example, in assembling record players (shown above), changing to Keller Air Tools made the work easier and faster, and substantially reduced production costs.

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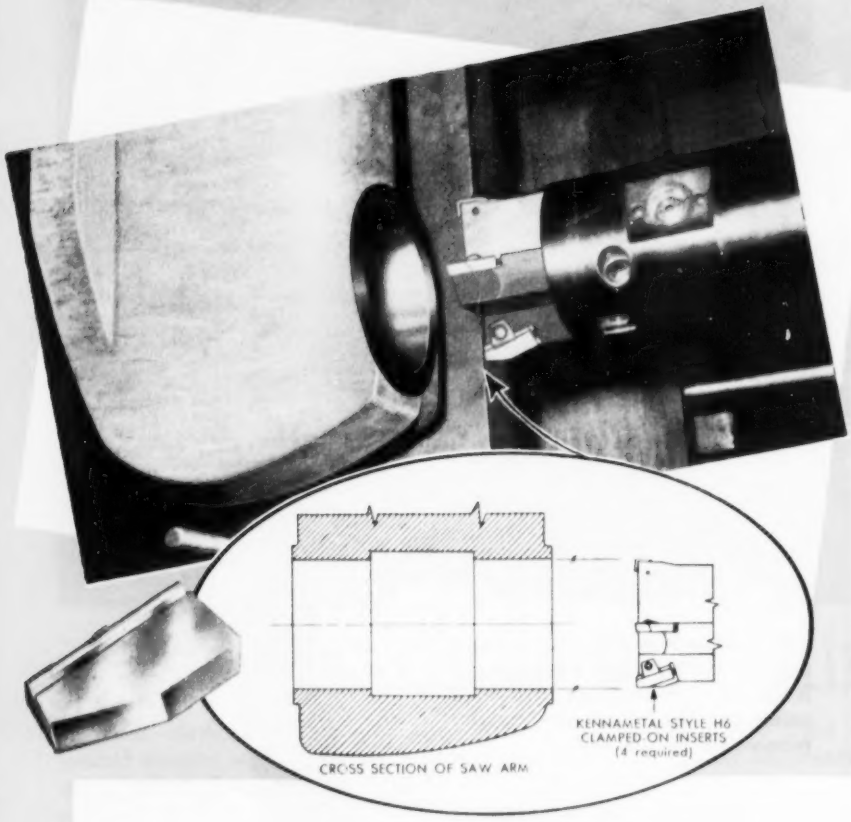
How to make A BORING JOB *LESS BORING*



Time, cost, and trouble were minimized in boring a 4.7" diameter hole in cast iron saw arms by these tooling changes:

A standard tool Style C-12 was replaced by a special boring heading having four standard clamped-on Kennametal inserts Style H6, Grade K6. Speed was increased 20% and feed doubled. Boring time was reduced 60%.

Before any tool sharpening was needed about 250 pieces had been bored. After six regrinds the inserts were advanced, this procedure being repeated until half of their length was utilized. Stubs were salvaged for tips on brazed tools.

Total life per set of inserts was 12,500 pieces — unit tool cost only 1/5¢. Obviously the job was less troublesome.

Although your machining problem is different, it also might admit improvement by use of Kennametal tooling. Our Tool Engineers will be glad to help. Kennametal Inc., Latrobe, Pa.

KENNAMETAL
CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

don't compel all of your men to work as much of their lives as the old man apparently has.

"Oh, no," replied the manager, "He is a pensioner and is the best man on art work we've ever had. He works a few minutes or a couple of hours per day to suit himself, but when he goes for good we can never replace him. The younger man working by him is very good but he will never be equal to the old fellow."

Here was a case where a replacement was out of the question, and not to be had, for the talent was lacking.

Now while Al usually has the more level head, Ed is correct in suggesting that Al should have an understudy, for no man should leave an employer in the lurch; he may want a reference later in his life and his chances would be slim. Last but not least, Al might wish to return to Reynolds some time in the future; this is a matter to be considered, too.

F H Stebbins
Worcester, NY

•

SHOP WORN

What is the best way of handling the case of a shop foreman who appears to have outlived his usefulness? Is the company to blame for not providing him with sufficient opportunities to keep abreast of new developments as they come along? Should the man be offered a lesser job, and kept on for the benefit of his years of experience?

THERE ARE MANY examples of a long-established business dying of hardening of the arteries. As the business grew older, so did its employees. A kindly management kept the older employees in positions of responsibility so that the business failed to keep pace with new ideas of a younger generation. It fell behind, and eventually had to be taken over by a competitor more up-to-date and on his toes.

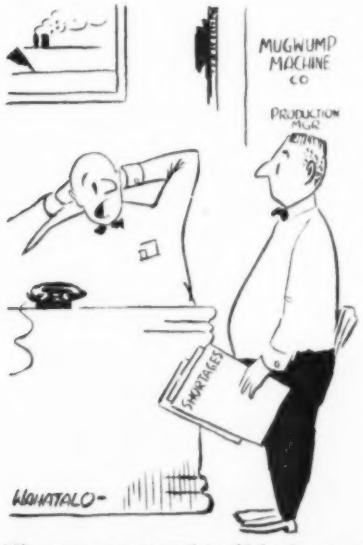
The problem of the older employee, be he executive or humble shopman, whose job outreaches him due to age has merited the attention of many progressive companies to seek an equitable solution. Should industry scrap its old men, who, it is claimed, have outlived their usefulness? Many companies are extremely proud of their old men, and believe that there is no good reason why a man's age should be his cross. The only time a man is too old to work is when he loses interest in his daily life. So nobody fears the years

at such a company. Nobody is haunted by his birthday or the stigma of having outlived his usefulness and inability to keep up with the times.

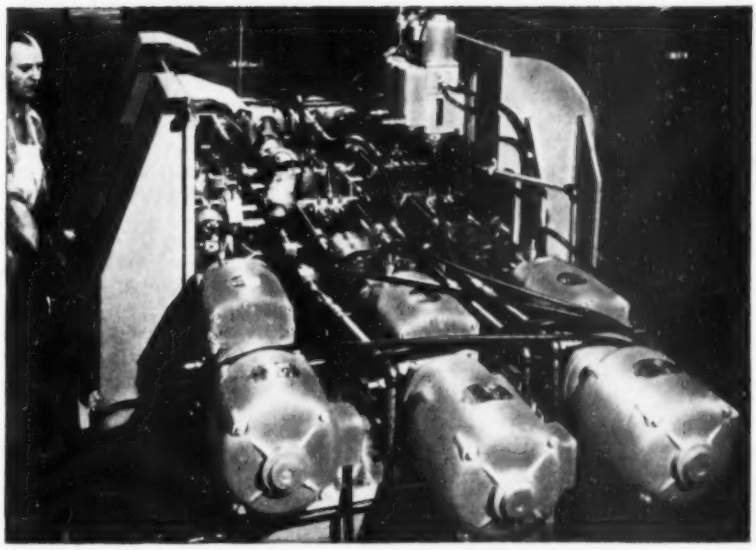
A solution to the problem of the executive or factory worker who has reached the slowdown stage of his career—and we all get there in time—is to put all the jobs which might be handled by men of this type in charge of a special personnel officer. Other jobs of the same sort can be created. Special care, however, should be taken to pick out jobs in which men feel the pride of craftsmanship.

The older executive may like his work and want to keep on, but as everyone knows, we all slow down as the hands on the clock of life creep around to the three-score mark. This problem demands study in shifting the man to a department where he will find the satisfaction of doing a good job himself and of helping others find themselves.

I have seen a brochure entitled "We've Gone Places Together" which is given to a company's 25-year service men. It states "When you started your work with us 25 years ago, we were a small company. Today, with your help, we have become a great name. Our achievements are yours, for you, yourself, are the men who have had a hand not only in building the machines that have made us famous, but actually forming the character of a great company itself." In honoring the 25-year men in this unusual way, an effective answer was made to the criticism that industry is through with a man when he reaches 40.



"Have you ever stopped to think where your job as expediter would be if it wasn't for my continual shortages?"



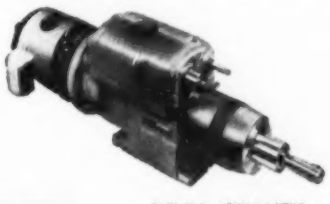
Machine Details
Dimensions: 10¾' long, 6½' wide, 7' high; weight about 16,000 lbs. 8 Delta drill units: 6 Model 19-400; 2 Model 19-150. 5 drill units equipped with multiple-spindle drill heads. Total HP—13.

Control Panel
Selector switches make possible any combination of 3 positions, 8 stations—a universal machine. Operator presses a starting button, sequence of operations is automatic, machine stops automatically when work is finished. 3000 feet of wiring between panel and machine.

When conventional tools required 25 minutes to complete 9 holes in a spirit-duplicator cylinder, A. B. Dick engineers built their own special horizontal drilling machine, using 8 Delta air powered hydraulic drill units, and now do the job in less than two minutes.

Their new machine drills, spot faces and reams 9 holes in aluminum cylinders—needs but a single operator, has automatic remote control.

Operation of this 3-position, 8-station machine consists of loading and pressing the starting button. The Delta drill units operate in four banks, in automatically controlled sequence of drilling, spot facing, milling and reaming. When the cycle is completed, the finished piece returns to original position and the machine stops. It is universal—handles any piece up to 12" diameter and 24" length.



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One of the best solutions to a problem such as is presented here of what to do with the executive whose job has outreached him, and whose age militates against transfer to another position, is the deferred compensation plan. On the theory that a portion of excess profits properly should be divided with those employees who have made the earnings possible, a number of companies set aside some of these profits as a retirement fund. This guards against accumulating too large a percentage of executives and employees who are out of tune with the needs and viewpoints of the oncoming generation. This retirement plan permits a man to retire and make way for a younger man when he has reached the slowdown age, or completed a certain term of service with the company.

The problem of what to do with a foreman when age takes its toll ceases to be a problem when it is considered in the light that there is no substitute for experience. Management recognizes the need of younger men in industry, and also realizes that the rapidity with which these younger men reach the actual productive stage is due entirely to the character and ability of the older men who train them. The foreman who has to step down because he has allegedly outlived his usefulness as a foreman should not be forced to step out of the company. His experience should be utilized for training younger men.

Many firms are well equipped with seasoned men for training. The value of the older men is capitalized on because it is felt that younger men will accept instruction more readily from them than they would accept

"What's wrong with makin' the job a little less monotonous?"

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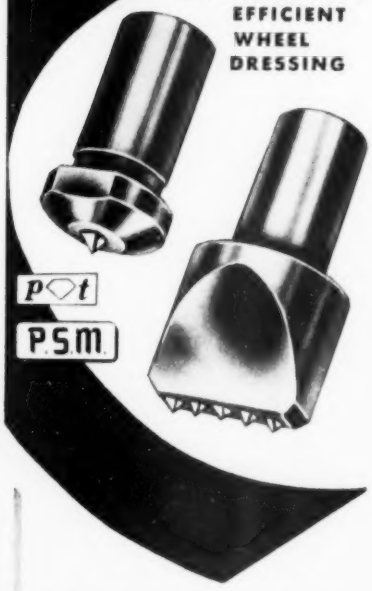

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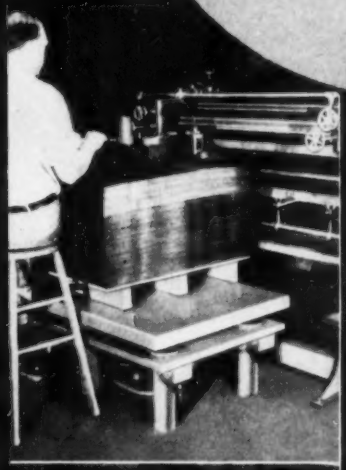

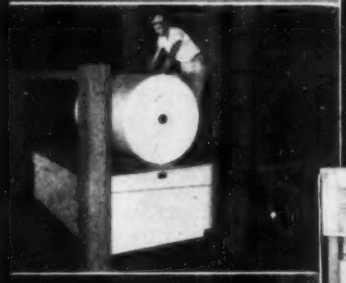

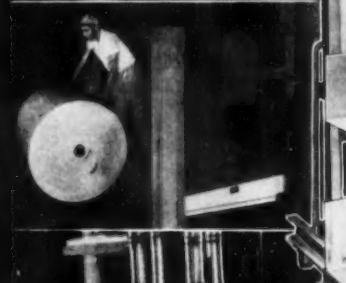

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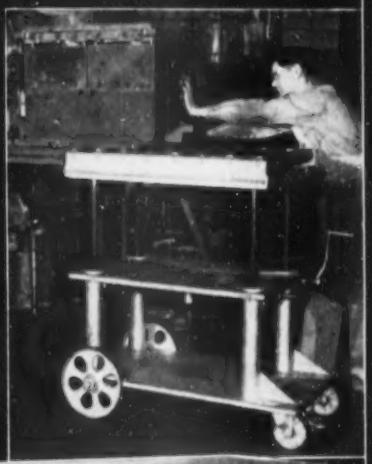

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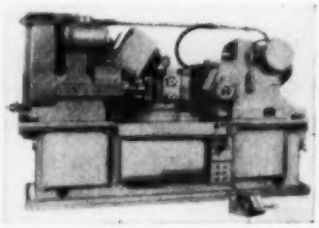
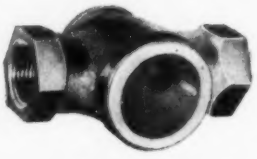
The Goss & DeLeeuw "One-Two-Three" Chucker differs from the conventional machine in that it provides the means of machining more than one end of a piece in a single handling instead of requiring several handlings and set-ups. A worthwhile gain in production time is assured.

In the "1-2-3", work is gripped in chuck and all ends machined either in sequence or simultaneously. Goss & DeLeeuw and only Goss & DeLeeuw offers this feature in a standard chucking machine.





A few typical parts finished on this machine are shown here. Write for detailed description . . . send samples of your work for time and cost estimates.

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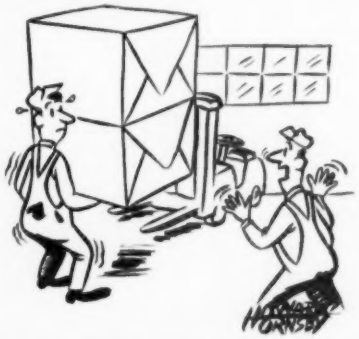
the teachings of a young theorist.

In the case under discussion, there seems to be a lack of proper handling of the executive whose job is alleged to have outreached him. Burke was a machine-shop foreman who capably performed his duties for a sufficient length of time to have warranted his retention. The story that he had outlived his usefulness and couldn't keep up with the times seemed to have been dreamed up by the new-broom manager. The fact that the employment manager was lily-livered in handling the case is no criterion of the value of the foreman to the company in the past, present, or future. He was not an adequate judge of the foreman's value to the company because of his own worry in trying to please the new manager and being a yes man in keeping his own job.

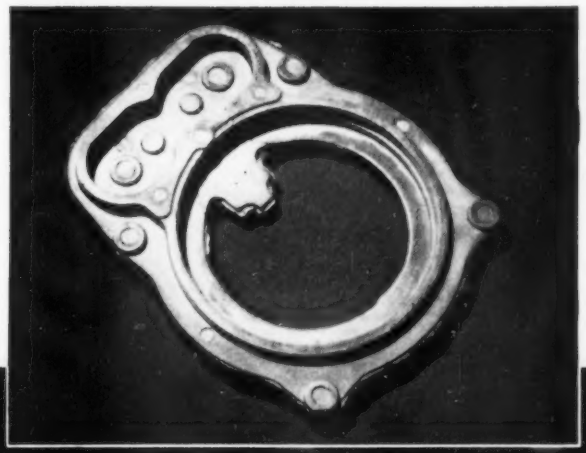
A foreman who had the enviable record of growing and progressing with the company, as this foreman had obviously is certainly entitled to a better deal than he received at the hands of the company he helped to enlarge. I don't blame him for his negative reaction to an offer of a lesser job in these circumstances. After 20 years with the same company in which he amply demonstrated his ability to serve efficiently, and would continue to do so, he shouldn't have been expected to step down because the new manager felt he should. From the facts of the case, it would appear that no inkling of any deficiency in his capabilities or foremanship ability was given to him by the front office.

It's true that a new broom sweeps clean, but management should always beware of the new broom that seeks to sweep in the wrong direction.

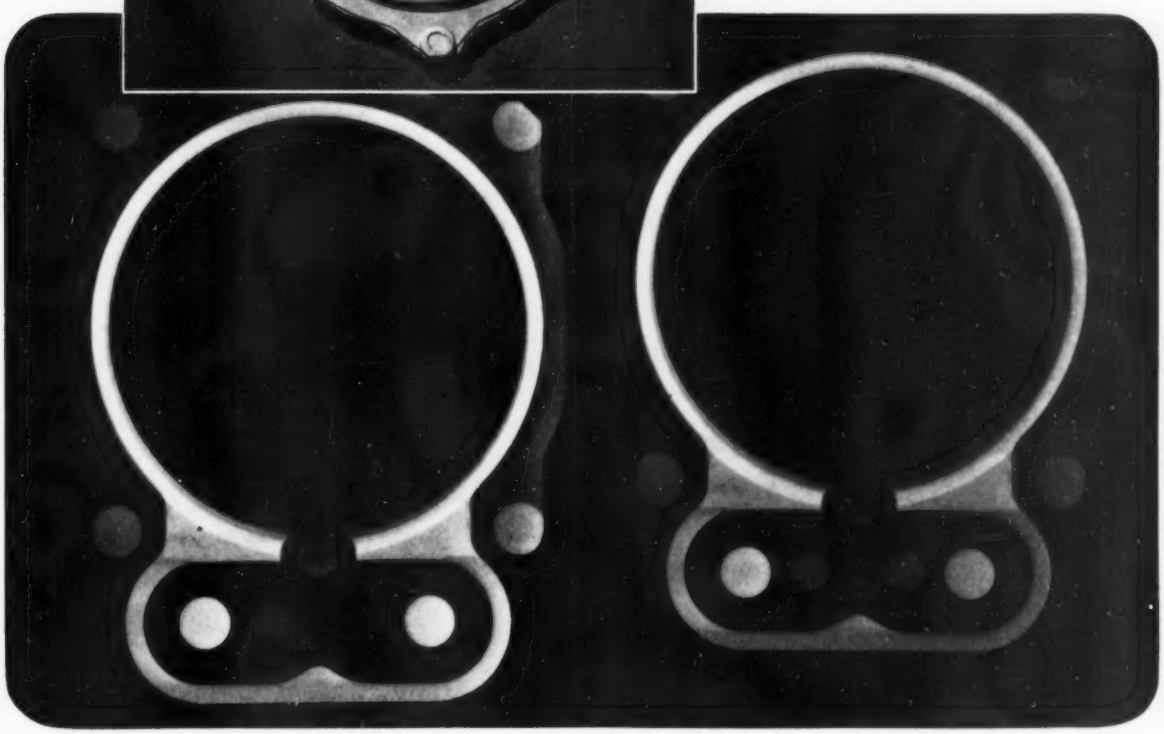
The foreman in this case changed with the shop; he made all the beneficial changes in a loyal and conscientious manner. He grew and progressed as the shop grew and progressed. It would seem to me that



"No, no, Gortney, you run under the load with your truck forks."



Sound?



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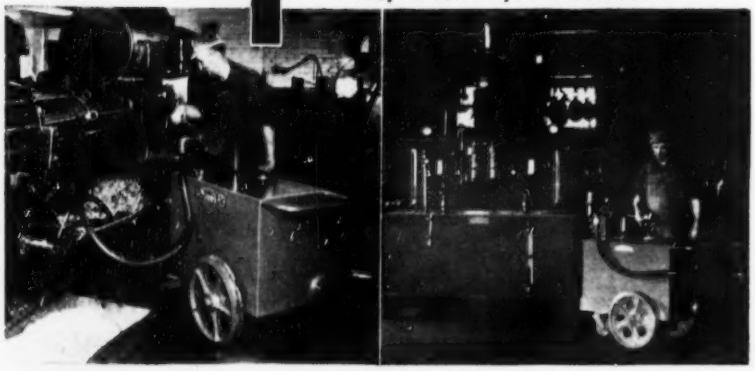

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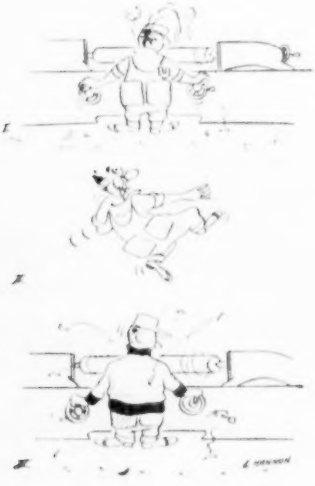
the case needs an airing, especially from the standpoint of the other foremen in the plant. Their loyalty and effort will certainly be impugned by the example of the new manager's arbitrary action in the case of the alleged inefficiency of Burke.

On what grounds was the personnel man justified in claiming that the foreman lost touch with his machines, and couldn't adapt himself to modern tools and methods, and handling personnel? Did production records substantiate these charges? An explanation of the charges is certainly justified in the interests of good foremanship relations.

If it's a case of playing wrong politics with the new manager, or if the company is trying to get out of paying retirement pay, an explanation is due. The fact that the foreman still had ten good years in him is all the more reason to right a wrong that had been done in forcing demotion on a loyal worker. Of course the topside couldn't figure out what to do in this case; the only fair solution would have been to keep the man on. They couldn't put him back on labor without upsetting all the other foremen. The alleged claim that they couldn't make him a methods man because his ideas on methods were out of date appears to have been a convenient excuse for an inexcusable action on the part of the new manager. It is to the foreman's credit that his conscience was clear enough to refuse acceptance of a job with less prestige or income or reduced responsibilities as a shabby alternative to demotion from his foreman's rating.

Where conditions actually exist that demonstrate a foreman's unfitness for his job, then the shoe is on the other foot. I do not believe that any man should be retained in his



job, be he foreman or worker, where he has demonstrated inability to carry out his duties. When a foreman loses contact with operation of his machines, fails to adapt himself to modern tools, methods, and handling of personnel, then management has only one course to follow. If he refuses to accept a position with less prestige, income, or reduced responsibilities with the same company, then the only alternative is dismissal.

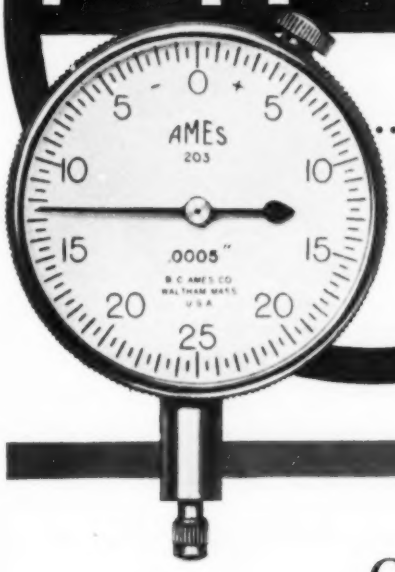
Demotion of a time-tested foreman because his manager is of the opinion that he does not at present measure up to modern requirements of good foremanship is a risky procedure because of its effect on other foremen and workers in the department. Unless the charge can be backed up by reduced production records, excessive production costs or poor personnel handling, the excuse for demotion is threadbare. It impugns the good judgment of the manager in keeping the foreman in that position through past years, and questions his judgment in a snap decision where the foreman has demonstrated his ability in the past without prior criticism.

The foreman in this case should have had ample opportunity to meet with management and state his case before demotion was imposed. A fair and impartial management should have investigated the allegations of unsatisfactory foremanship claimed by the new-broom manager and justice in this case would probably have been on the side of the foreman. Delay of justice is an injustice. All the facts in the case appear to warrant retention of the foreman, and from an unbiased observer, it would appear that the manager erred in forcing the demotion.

Harry Kaufman
Philadelphia, Pa

"Wouldn't you say it was about time we had a few of the older machines replaced, J B?"

AMES



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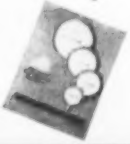

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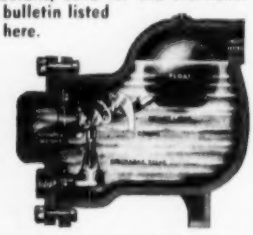


NICHOLSON AIR TRAPS—For intercoolers, aftercoolers, receivers, tanks, etc. Feature non-plug and non-wire-drawing valve. Instantaneous operation and extra large drainage capacity effect fast, positive action. Catalog 751.

NICHOLSON CONTROL VALVES — Specially treated hard seats, wide choice of metals for specific mediums, and easy repacking cut maintenance time. Non-corrosive flat discs lap themselves on seats. Many leading plants have adopted Nicholson valves because of their longer leak-free service. 2-, 3-, 4-way and special types. All manner of operation. Size ¼" to 2½"; press. to 5000 lbs. Catalog 552.

NICHOLSON EXPANDING MANDRELS—Set of 14 does work of 209 solid arbors; sensational time savers in some operations. Sold singly or in sets; for bores ½" to 7". The standard in shops the nation over. Bulletin 750.

114 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

YES, ED, THE new-broom manager over at Apex should rightly be called a big stinker, considering the methods he uses to gain merit for himself. Many new managers act that way to show the directors that they are strong men. It's also possible that the head of the firm knows nothing about his behaviour or the manager might have lied about Burke in order to get the director's sanction to demote him.

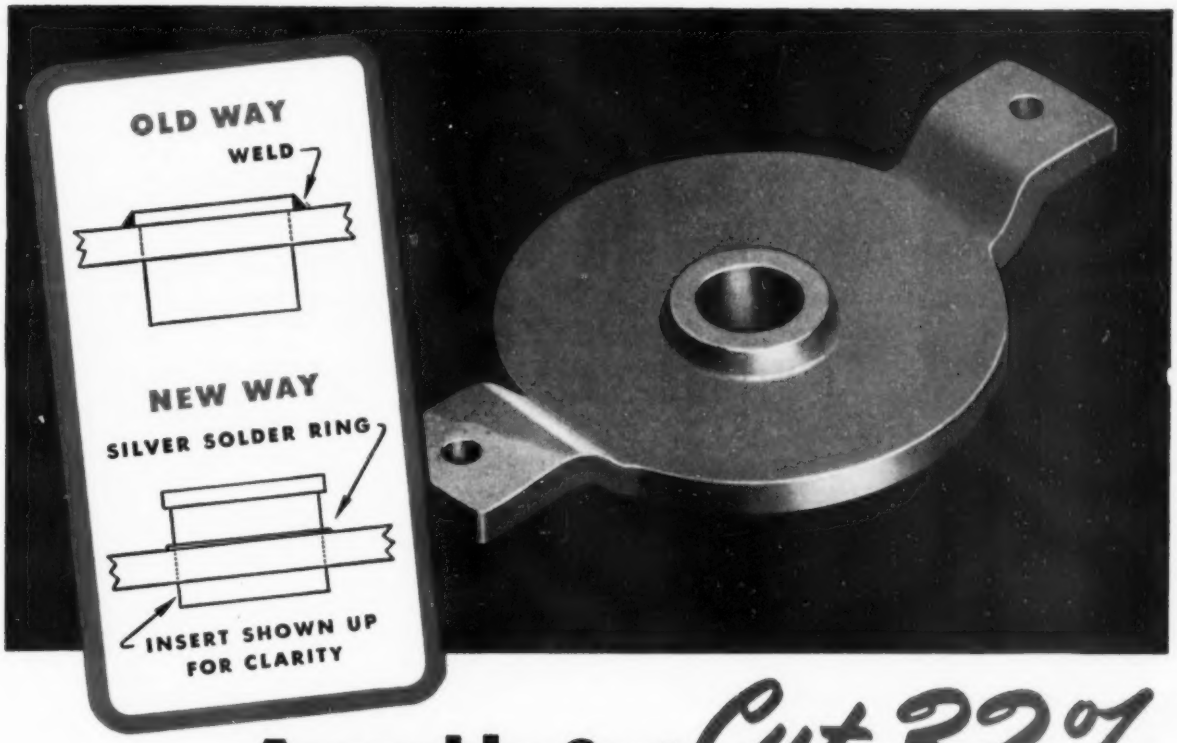
Apparently the new manager is abusing the helplessness of Burke; he's too old to get a corresponding job with another firm and the manager knows it, yet he's demoting him. If I were treated that way I think I would call on the head of the firm and inquire what it was all about. If he said that he didn't want to interfere he would show himself to be of low character.

I think the manager's action against Burke is doing a great deal of harm to the whole company. Burke will leave the firm he's served for so many years without giving short weight with a sting in his heart.

Just think what would happen if the new manager demanded that the director should also be demoted for the same reason as Burke. There are many directors who have inherited small or large firms and ruined them because they have not had the ability to run them.

As regards the employment manager, I wonder from whom he got the tale that Burke had gradually lost touch with machines and couldn't adapt himself to modern tools and methods. Didn't Burke have anything to do with the expansion of his firm? Could Burke have got new, more efficient machines if he had been unable to

"I can make a few extra bucks nailing boxes with this end."



Assembly Cost *Cut 32%* with TOCCO* Induction Brazing

Now's the time to balance YOUR production budget

This assembly may bear no resemblance to your product, but its case is typical of the savings accomplished by Induction Heating of metal parts of all sizes and shapes.

Formerly the Norris Thermador Corporation used arc welding to join the bushing and clamp shown above. In an effort to reduce costs TOCCO Induction Heating was brought into the production picture with the following results:

OLD METHOD (Arc Welding)		**NEW METHOD** (TOCCO Induction Brazing)	
Material (rod)	$ 4.56 per M parts	Material (solder and flux)	$13.83 per M parts
Labor	20.63 per M parts	Labor	8.82 per M parts
Overhead	21.25 per M parts	Overhead	9.08 per M parts
Total Cost Old Method	$46.44 per M parts	Total Cost TOCCO Method	$31.73 per M parts

TOCCO Engineers are glad to survey your operations for similar cost-cutting results — no obligation, of course.

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Designed for general purpose grinding, it takes a 2" organic wheel, but can be used with rotary files and cutters as well. Buckeye one-piece shaft construction does away with costly replacement of wearing parts.

Available in two types—lever throttle (as illustrated) or lock button throttle, these grinders are the latest additions to the Buckeye "A" Series—ounce for ounce the most powerful air tools you've ever seen.

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use them effectively? And shouldn't he still use the whip for the loafers? If Burke himself was a loafer his fate would serve him right, but so far as I can see this hasn't been said about him from any quarter.

It seems to me that the whole story about Burke is a lie from beginning to end. Should Burke pat the loafers on the shoulder and inquire about their health?

I think it's all wrong to chop Burke down. If any executive is really outreached and cannot take care of his job, something must be done about it. But in this case I cannot see any sound argument that would support even a theory that Burke is unable to keep up with the times. Until such arguments are advanced I think it's fair to keep him at his job as a foreman.

A E Fristedt
Stockholm-Bromma, Sweden

WHAT CAN BE done with the executive whose job outreaches him?

Many things; he can be sacked, suffered, shamed or shown, to name only four of a wide selection of actions that may be taken to end an unsatisfactory or intolerable situation.

If Burke, after twenty-years as machine shop foreman at Apex, is not prepared to be changed round in the interests of re-organization, it does not automatically follow that all the blame or, indeed, any of the blame should fall on the new-broom manager. Presumably, the new manager will have been engaged for a specific purpose and if a change of job for Burke, without financial loss, is necessary in the manager's opinion, he must be given a chance to show his paces without becoming entangled in a web of personal preferences or prejudices.

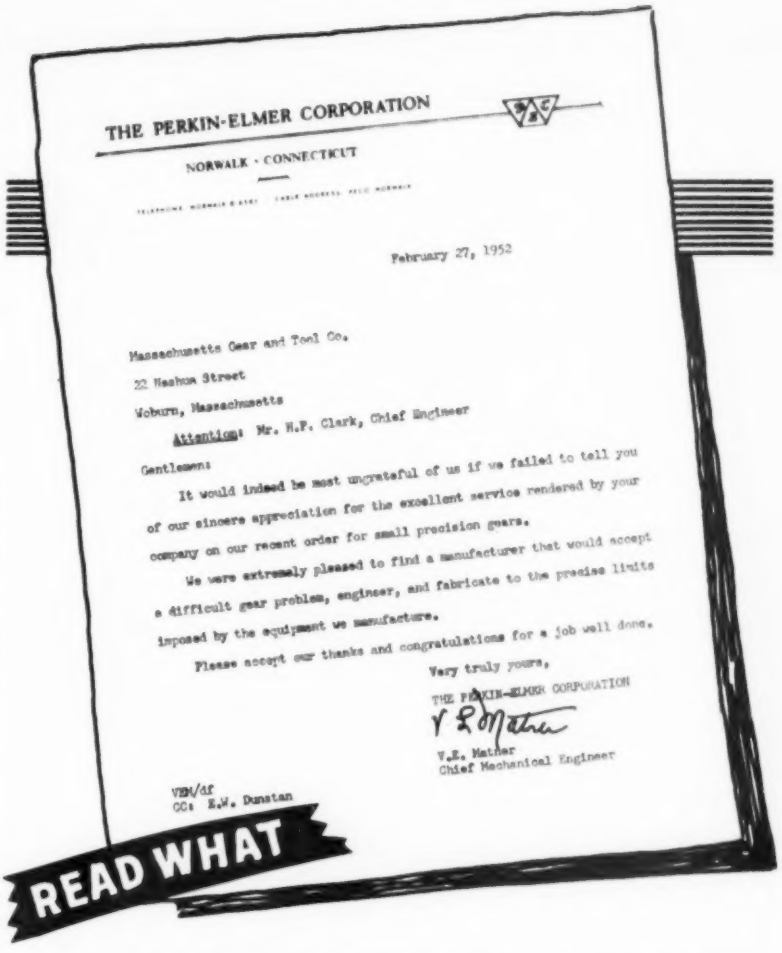
The Burkes are a strange mixture,

difficult to place. Were he a really good, interested, and progressive executive, Burke, after twenty years with Apex should have known the job as intimately as he would the back of his hand. No matter how good the new-broom manager might be, an enthusiastic, progressive, dependable foreman with twenty years' experience of the company's products behind him should have been a tower of strength, an almost priceless asset to the new boss. Such treasure is not to be lightly cast aside. The world depends on dependable people—they are pearls of great price and I have yet to meet the good manager who would not cheerfully go to almost any lengths to retain the services of such men. That, I think, is the general attitude among responsible managers who, after all, successfully hold down their own jobs in direct proportion to the quality of their foremen.

If Burke, after twenty years with the company, fell short of those qualities, the new manager, if only in self defense, must take stock of the position as he sees it and must apply what, to him, is the appropriate remedy. If the foreman is obdurate and obstinately refuses an alternative job, the manager could hardly be blamed for dispensing with his services. It may be objected "If Burke was good enough for twenty years —(but was he?)—why is he not good enough now?" Circumstances alter cases, of course, and the obvious reply is "Why is a new manager considered to be necessary?"

In the circumstances, we must assume that no intelligent manager would willingly throw away the

"I wish the trucker would hurry . . . just listen to this machine depreciating!"


THE PERKIN-ELMER CORPORATION

NORWALK - CONNECTICUT

February 27, 1952

Massachusetts Gear and Tool Co.
22 Meahun Street
Woburn, Massachusetts

Attention: Mr. H.P. Clark, Chief Engineer

Gentlemen:

It would indeed be most ungrateful of us if we failed to tell you of our sincere appreciation for the excellent service rendered by your company on our recent order for small precision gears.

We were extremely pleased to find a manufacturer that would accept a difficult gear problem, engineer, and fabricate to the precise limits imposed by the equipment we manufacture.

Please accept our thanks and congratulations for a job well done.

Very truly yours,

THE PERKIN-ELMER CORPORATION

V.E. Mather
Chief Mechanical Engineer

VEM/df
CC: E.W. Dunstan

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***MASS GEAR'S** engineering and manufacturing service*

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ILLUSTRATED LITERATURE ON REQUEST.

Mass Gears

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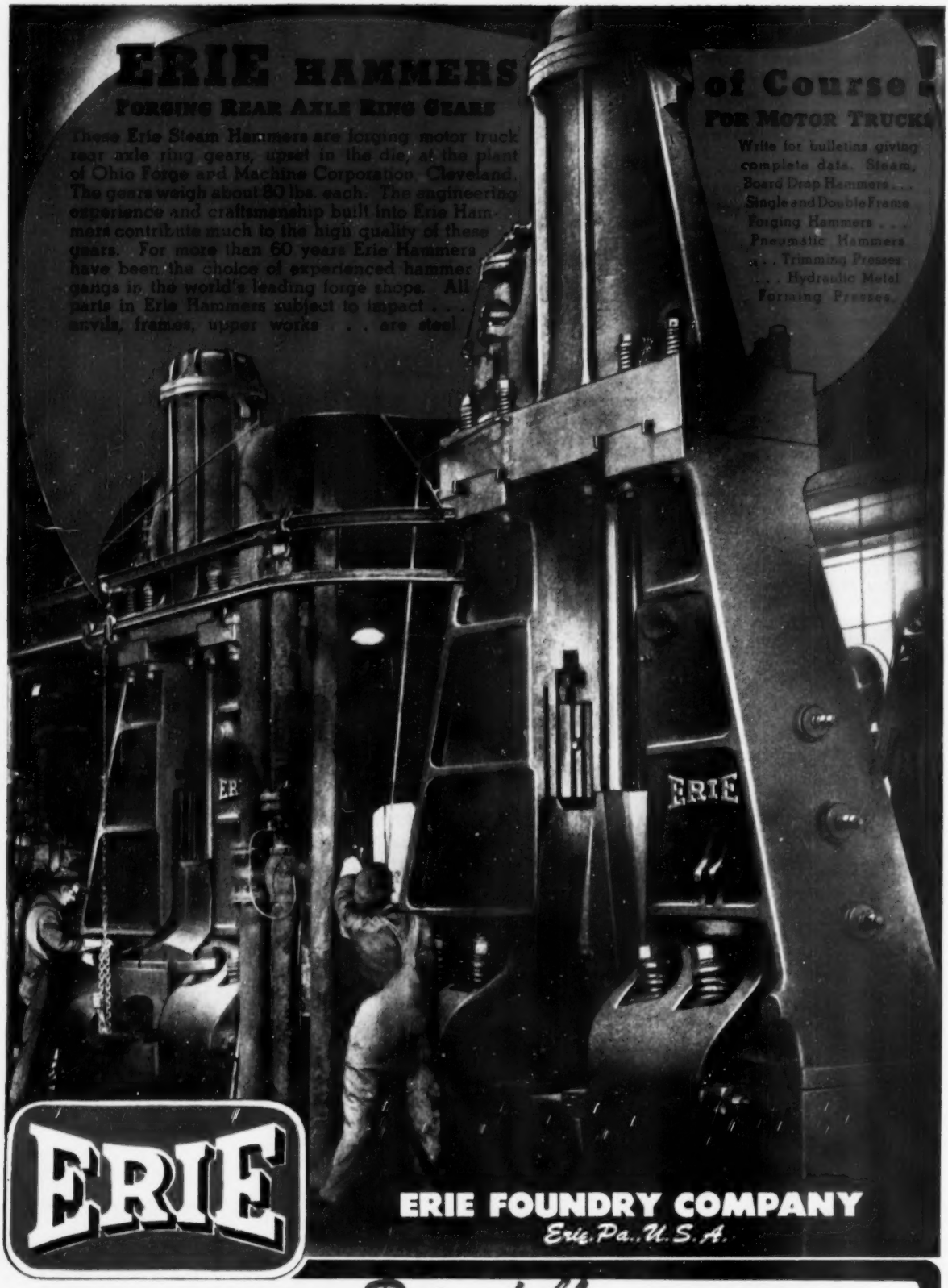
Woburn, Mass.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Write for bulletins giving complete data. Steam, Board Drop Hammers . . . Single and Double Frame Forging Hammers . . . Pneumatic Hammers . . . Trimming Presses . . . Hydraulic Metal Forming Presses.
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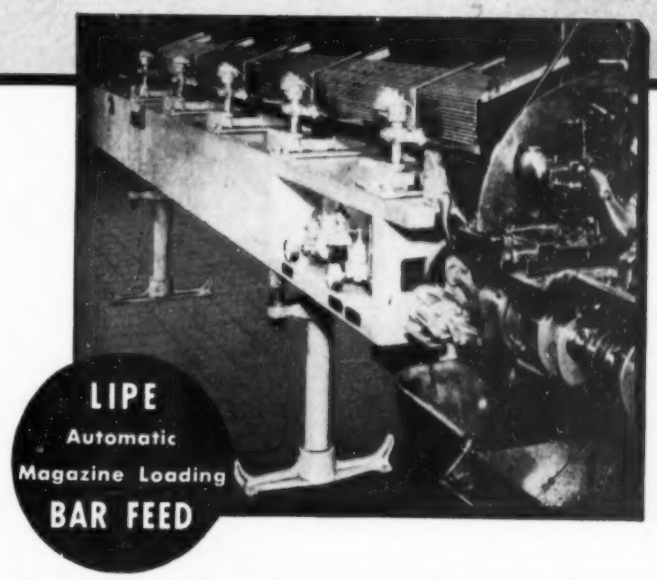
ERIE BUILDS Dependable HAMMERS

services of a thoroughly good foreman. If the higher management suspected him of being guilty of such an indefensible blunder, it would be their responsibility and duty to investigate the matter. Burke or any other foreman of long service might be suffered at the behest of the higher management on grounds of sentiment, but such action would naturally bring them into conflict with the new production manager who could point to Burke's lack of administrative qualities in the event of unsatisfactory machine shop results.

The method of shaming or assisting the unsatisfactory foreman into leaving of his own accord, or agreeing to a reshuffle, is the most satisfactory; in the hands of a practical, competent production manager it is simple and convincing. It consists of the manager demonstrating the successful application of some new method or procedure which the foreman fell down on or held to be unworkable. Properly applied, there is no effective counter to that method, no loop-hole through which a publicity-seeking shop steward might muscle in. If "the mixture as before" is repeated at intervals on different applications, the foreman, if not mentally equipped to cope with modern methods, either leaves of his own accord or accepts some other job more in line with his capacity. If he is of the mulish, sullen, stubborn breed and refuses to leave or accept alternative employment, that is an ultimatum and no manager can accept it. If industry is to function successfully, *all* must face facts, be reasonable, or take the consequences of ignoring economic truths.

"It's stopped clock-watching better than anything we've ever tried—"

BOOST SCREW MACHINE OUTPUT 60% to 100%...EVEN MORE!



Suppose you could run your screw machine continuously—get a *full* 8-hour-day production—with no time lost for loading, replacing feed fingers, cutting air or idle operation. How much would your production go up? 10%? 20%?

Revise your estimate—you're way low. By converting lost time into productive time in hundreds of plants, *Lipe Automatic Magazine Loading Bar Feeds* have increased output 60% to 100%. One user reports a production increase of 221%!

WHAT A LIPE AML BAR FEED WILL DO FOR YOU:

Feed tubes or bars automatically, continuously.

Abolish feed fingers—eliminate time lost in making feed finger adjustments.

Feed stock up to 16" long in one feed-out operation—save the time lost with multiple feed finger feed-outs, thus cutting cycle time.

Reduced cycle time increases gross geared production capacity of screw machine.

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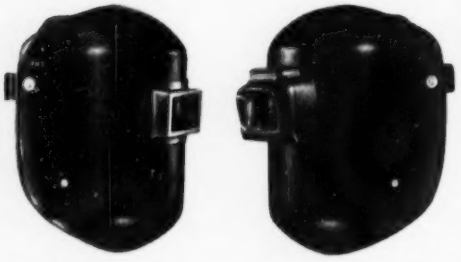

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• Exterior finish is smooth and easy to clean. Interior is dull-coated to reduce reflections. Standard 2" x 4¼" lenses.

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The fourth method is to teach the foreman new methods, applicable to new requirements. Several courses of training within industry might suffice if the foreman is willing, eager and receptive, but without these qualities no amount of tuition is likely to succeed. The suggested teaching is generally a long term policy; on the whole, old dogs are slow to learn new tricks, but not all of them, and it would be for the manager to decide if the game was worth the candle. This decision could only be made after careful and sympathetic observation of the foreman's ability to absorb the dope and apply it. What are the company's responsibilities to foremen? Good working conditions, fair assessment, adequate salary to enable foremen to maintain the dignity of their position, prospects or promotion, retiring allowance frequently reviewed to match living costs; this in exchange for efficient, loyal service to the company. Good working conditions include the provision of all reasonable assistance to foremen in the discharge of what is admittedly a difficult job. Changes of policy or production activities should not be sprung on foremen but should be made known to them as much in advance as circumstances permit. This enables them to adjust themselves to changing conditions; those who find difficulty in doing so and who have hitherto proved to be fit for their jobs should be given all needful help and instruction. The rest is up to the foremen.

The most hopeful and, perhaps, the least acrimonious way of replacing a long-service foreman who is deemed to be losing grip and is not of retiring age, is to kick him upstairs. He should be given the

"I'd like to approve it, Hank.—The only thing that holds me back is a little common sense."

feeling that his long service and knowledge of the company's work is such that the higher ups wish to recognize it and that it would be more of a help to the company and the higher management were he located beside them in the front office, than if he remained in the shops. Also, it might be hinted that he had endured the heat and burden of securing production and handling increasingly difficult labor long enough and that a younger man should be had to shoulder those wearing responsibilities.

A foreman with a long and comprehensive machine shop experience, who is willing to cooperate, can be of great assistance in the estimating department of any engineering works. His usefulness would, of course, be seen at its best in the general engineering shops involved in variety production and repair work, where practically no job is standard and almost every inquiry introduces new production problems. In the costing department, also, his influence should be for good and he should be able to save much sifting time where costs appear too high.

The demoted/promoted foreman, with actual and recent shop experience, can be usefully employed in following up inquiries and discussing practical possibilities with potential customers, many of whom like discussing their ideas, their fears, and doubts with experienced practical men.

Finally, he can be of value to his company in investigating complaints —which no company likes, but which occasionally arise—from customers, and in supervising installations and tryout runs in loco, on his company's products.

Those suggested activities would keep the demoted/promoted foreman fully occupied and at a profit to the company, since, were he interested and willing, he could not help saving his employers more than his salary.

Should the foreman refuse to have anything to do with alternatives, then goodbye to smoothness.

You can take a horse to the water but you cannot make it drink. If he also refuses to resign, he is, in effect, saying "I am staying here, I am working on this job and no other." There is only one answer to continued obstruction or misguided defiance from any employee, however highly placed; it has "nowt" to do with smoothness nor appeasement either.

M Donald
Lanarkshire, Scotland

"WHO CUT THIS 0.0006" UNDERSIZE?"

Reprinted with permission of the *American Machinist*

DO YOU NEED A

"PUTTIN'-ON-TOOL"

for salvaging undersize parts, worn tools and gages right in your own plant?

Now, with the Chromaster industrial chrome plating unit, you can restore undersize components or worn tools to exact dimensions, easily and simply, in a matter of minutes. With Chromaster, you will be able to salvage thousands of dollars worth of material you're now throwing into the scrap bin.

Here are the facts about Chromaster:

- **SIMPLE TO OPERATE**
- **NO PREVIOUS PLATING EXPERIENCE NEEDED**
- **FAST DEPOSIT RATE. .002" per hour**
- **CHEMICALLY STABLE PLATING SOLUTION**
- **LOW PLATING COST . . . only 7 mils per sq. in. .002" thick**

Now take a look at a few of the actual savings the Chromaster has made in other plants.

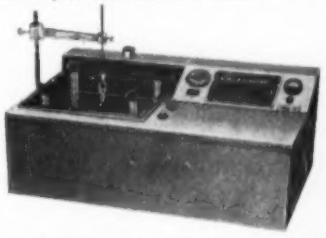
ACTUAL CHROMASTER SAVINGS

A CHICAGO TOOL COMPANY with 1500 shafts ground undersize used a Chromaster to return them to their original size with a surface finish of greater wear resistance.

A PHILADELPHIA MANUFACTURER used Chromaster to correct an oversized cylinder bore by plating to size.

A BROOKLYN FOUNDRY saved two grinding operations and almost five hours in plating time on every component with Chromaster.

A CALIFORNIA AIRCRAFT FACTORY salvaged expensive worn-down reamers with Chromaster. The new plating increased their useful life from less than a day to better than three weeks.



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Model A-20 is a 20-amp, bench-mounted unit for the gage room or tool crib, plates up to 10 sq. in.

Model A-50, 50-amp, bench-mounted unit for larger shops in plating of cutting tools. Plates up to 25 sq. in.

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A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.

CANTON 6, OHIO

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CLEVELAND *lead screw* **tapping machines**

NEW BOOKS

MACHINE TOOL SELLING *(Second edition)—By Harry J Loberg, Director, Sibley School of Mechanical Engineering, Cornell University. Published by McGraw-Hill Book Co, 330 W 42 St, New York, N Y. 194 pages. Price $5.*

Based on a two-week refresher course held at Cornell in July, 1948, the first edition of this book was intended to give the starting machine-tool salesman a broad survey of his field. Since that time, several other sales conferences have been held, and material from these sessions has been incorporated into the second edition. Also, recent statistical data on sales and demand have been added, as well as a chapter on legal aspects of selling.

The book is basic, broad in scope. The result is a fast summary of machine-tool selling, rather than a detailed study of any one phase of the problem.

WELDESIGN MANUAL. *Published by The Lincoln Electric Co, 22801 St Clair Ave, Cleveland 17, Ohio. Price $10 in USA, $12 elsewhere.*

This publication presents a complete home-study course in designing low-cost machines in steel. The unit consists of a manual that outlines the design system, step by step, and gives data, charts, nomographs, tables, cost calculator, process selection guides, and time charts; instructions for using the manual for study; a cost calculator slide rule; a set of weld standards printed on onion skin; and a copy of the *Welding Procedure Handbook.*

The program covered by this course has been used by Lincoln engineers for in-plant training of more than 10,000 designers. Now, for the first time, it is available in printed form for home study. The basic manual covers the inherent qualities of steel as a material of construction, and the properties of weld metal. It then develops the WelDesign system, step by step, by showing how to create a design in steel. Most important is the manner in which it explains how a design can, and must, be modified for economical production. Instead of presupposing a complete engineering education and long experience, the manual provides all the information needed to produce an acceptable and economical design. Finally, it provides a guide to the ef-

Cities Service Cutting Oils Proved The Very Best By Micrometer Test!

CUTTER MEASURED WITH MICROMETER. As a final test, Automatic Pencil Sharpener measures each cutter with a micrometer. All tests proved that Cities Service cutting oil was absolutely tops for this really tough job.

STRICT SPECIFICATIONS REQUIRE FINEST CUTTING OIL. APSCO Sharpeners offer many more features than other brands. To produce their top quality product, Spengler-Loomis relies on top-quality lubrication products . . . Cities Service Products, famous throughout industry.

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Says Mr. C. J. Kostrzewa, Plant Superintendent: "Cutting oil requirements in our Automatic Pencil Sharpener Division are tough. To find the right coolant, we called for, and tested, samples from various companies. Over a period of testing time, we used graphs, charts and tables, keeping a running record on all coolants. As a final test, we measured the cutter with a micrometer before and after milling. The cutting oil that came out tops wa Cities Service.

"I'd also like to point out that the Cities Service Engineering staff co-operated fully by offering helpful advice and excellent se vice."

Why not discuss your lubrication problems with a Cities Service lubrication engineer? Write Cities Service Oil Company, Dept. G4, Sixty Wall Tower, New York 5, New York—or contact your nearest Cities Service office.

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QUALITY PETROLEUM PRODUCTS

MICRO limit switches make quill loading an automatic job at 96 Mill

Two MICRO heavy-duty limit switches automatically control the carriage travel of automatic hoists in the 96 Mill of the Matthews Mills at Greenwood, S. C.

The upper switch stops the motor when the carriage reaches the position for dumping the quills into the hopper which feeds the conveyor. The lower switch stops the motor when the carriage returns to the floor. Their use makes it unnecessary for the operator to remain at the hoist during the travel operation.

These switches were selected by the plant engineer of the 96 Mill for this operation because of their sturdy construction, their ability to withstand the high humidity and lint-laden mill atmosphere and because of the ready adjustability of the roller arm actuator to the exact position required.

Plant engineers and maintenance men are finding innumerable applications for MICRO switches to increase the productivity of their equipment by making it safer and more automatic. MICRO authorized distributors are located in key cities with complete stocks of MICRO for such plant applications. Consultation and advice on specific applications may be obtained from your nearest MICRO branch office.

MICRO MAKERS OF PRECISION SWITCHES

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

FREEPORT, ILLINOIS

fective use of welding to minimize welding costs, and suggestions for manufacturing with a welding department.

The guidebook gives detailed instructions in the use of the various charts and calculators, and the welding standards are designed for reproduction so all departments can use the same standards.

The well-known *Procedure Handbook of Arc Welding Design and Practice* completes the kit as reference and supplementary reading.

Lincoln deserves the highest commendation for this contribution to welding literature which deserves a place, not only in company libraries, but also on the bookshelf of every engineer concerned with the design of welded machines and equipment.

•

METAL CLEANING BIBLIOGRAPHICAL ABSTRACTS 1842-1951—*By Jay C Harris, Monsanto Chemical Co —Published by American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa. 132 pages. 6 x 9 in. Paper bound. Price $4.25.*

More than 1000 annotated references to the literature on metal cleaning published during the past 90 years are included in this valuable book. Some of the content was published in 1949 as Special Publication No. 90, followed by a supplement issued in 1950. The new publication, No. 90-B, includes all this earlier material, plus several hundred new items, and brings up to date the coverage of metal cleaning for all kinds of metal and by most types of processes.

References are arranged by year, and secondarily by author, or by the journal in which they appeared if anonymous, and are numbered consecutively. The abstracts have been thoroughly indexed: subject, author, specification, and patent.

"Well, another day, another $22.75!"

BORON STEEL *(Second Revised Edition, 1953)—By Ernest E Thum, Editor. Published by the American Society for Metals, 7301 Euclid Ave, Cleveland 3, Ohio. Paper-covered pamphlet, 113 pages, 8½ x 11 in. Price $1.*

This pamphlet is a compilation of special articles on the metallurgical properties and uses of boron steels. Authors represent some of the best known names in the steel, automotive and agricultural-implement industries. Some of the material is represented from *Metal Progress*; other items are papers delivered at various meetings. Boron steels are here to stay for all sorts of fabricated parts, from bolts to truck axles. Hence, this pamphlet is one of the few reference works that cover the subject adequately and authoritatively.

Where Are Tomorrow's Aircraft?

Aircraft industry earnings for the period 1934-1952 averaged roughly 2% of sales, after taxes. That is not enough to provide increased plant to make today's complex aircraft.

If government, as chief buyer of aircraft, restricts suppliers to limited return on net worth, companies will be unable to grow with their product. Government will then have to furnish more and more money to conduct the business. It would appear that the ills of nationalization would not be far away.

The answer is that, in the interest of national security, private industry must increase its capacity to keep pace with the product. And government must allow a normal return on the investment needed to provide this growth . . .

—Roy T Hurley, president, Curtiss-Wright Corp, speaking at the Airpower Preparedness Symposium, Detroit, Mich, late in 1952.

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. . . what's more, Lovejoy is set to give good delivery. Lovejoy's large engineering staff and modern manufacturing plant offer every facility for prompt production of standard milling cutters, as well as specials to meet unusual requirements.

The advanced design of Lovejoy mills offers unusual interchangeability of inserted blades and wedges in practically all styles and sizes, whether standard or special. Users appreciate the economy of this feature. And, no matter what the age of your Lovejoy housings, blades of H. S. S., alloy and carbide are promptly available from stock.

Our 35 years' experience in designing and building standard and special mills, *in all sizes*, can help you get the best results, economically, on all milling operations.

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HACK SAW BLADES ever made

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Your Disston Distributor will give you an eye-opening demonstration right in your plant—a comparison of your present blades with the new Disston blades. It won't take long for you to see that these blades offer *better cutting, far greater dollar value, longer life!*

Get far more for your hack saw dollars, call your Disston Distributor today!

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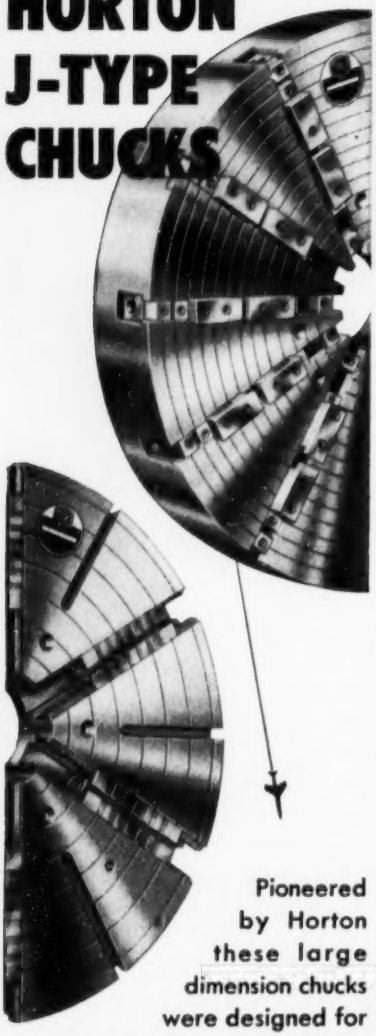
HORTON J-TYPE CHUCKS



Pioneered by Horton these large dimension chucks were designed for the aircraft industry especially for machining various jet engine parts.

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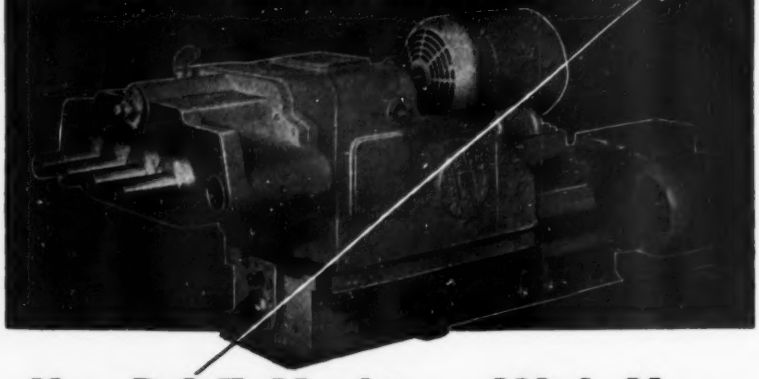
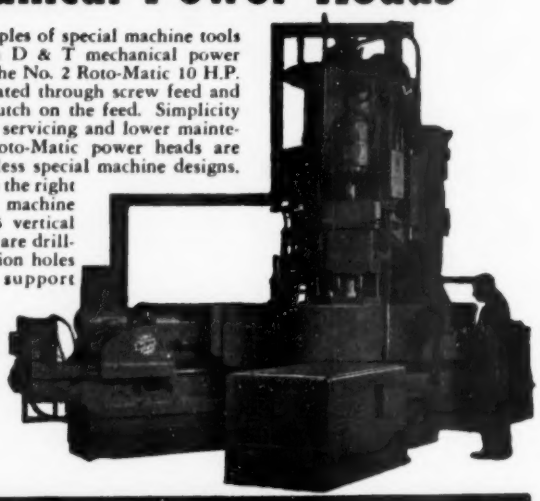


Use D&T Machines With New Mechanical Power Heads

Here are two good examples of special machine tools designed and built with D & T mechanical power heads. Shown above, is the No. 2 Roto-Matic 10 H.P. head. All sizes are operated through screw feed and have overload release clutch on the feed. Simplicity of design makes for less servicing and lower maintenance costs. D & T Roto-Matic power heads are readily adapted to countless special machine designs. For instance: Machine to the right is a 6 station indexing machine with 3 horizontal and 3 vertical power heads. Operations are drilling and reaming suspension holes and king pin holes in support arms for power heads.



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is available on the complete line of D & T machines. Ask for Bulletin 1000.

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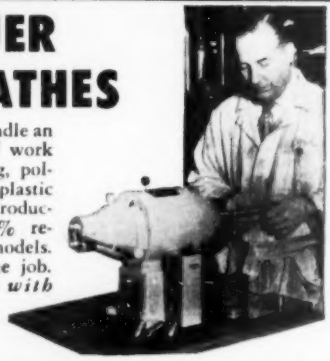
These versatile machines handle an almost *unlimited* variety of work —deburring, filing, lapping, polishing, etc.—on metal and plastic parts. Thousands in use. Production increases up to 158% reported! Many sizes and models. Holding devices to suit the job. *Speed your production with Schauer Speed Lathes.*



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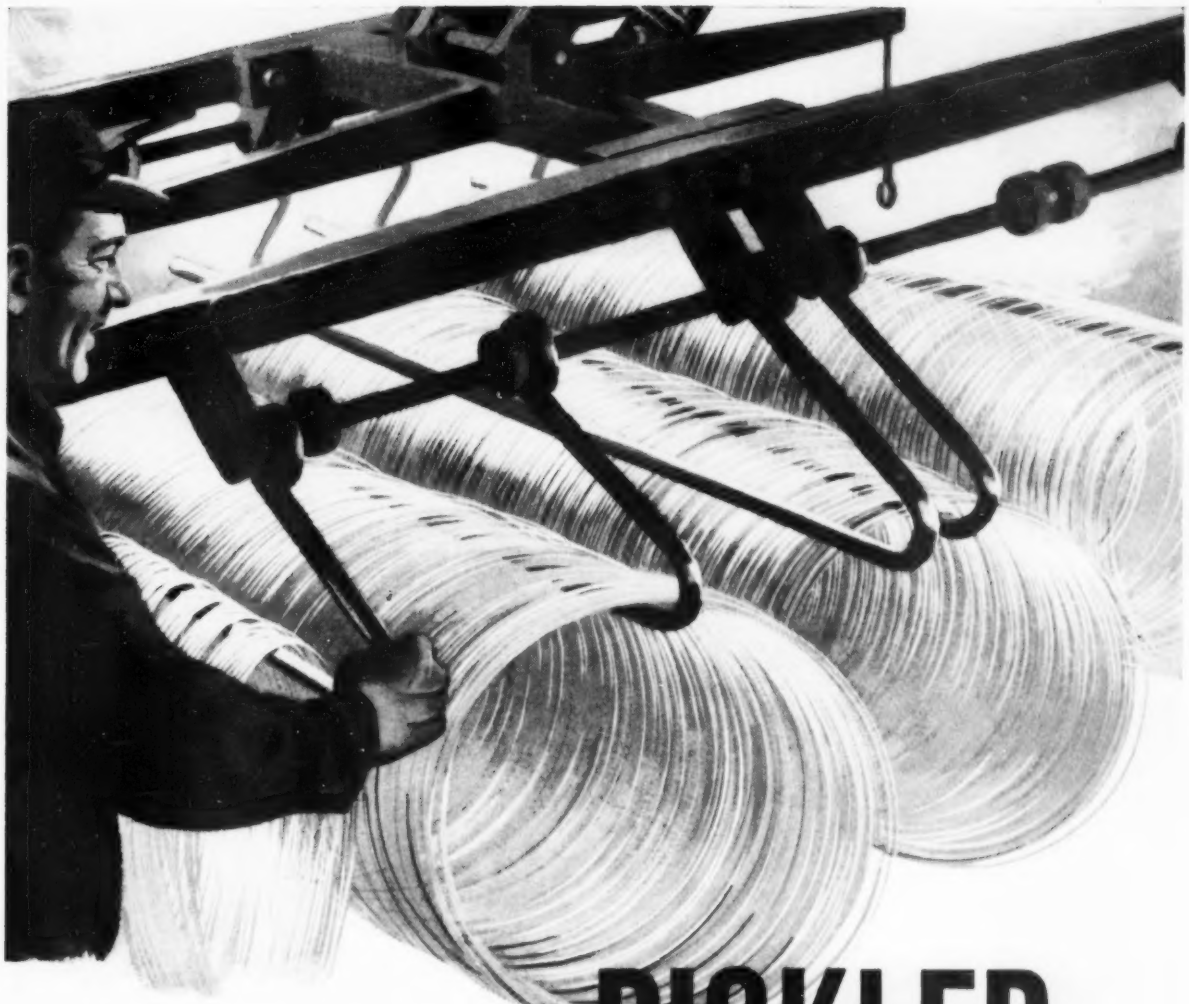
SCHAUER MANUFACTURING CORP. 4506 ALPINE AVENUE CINCINNATI 36, OHIO



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MEDIUM SIZE CAPACITY—

With FEATURES AND RANGE NORMALLY FOUND IN LARGER LATHES

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Ask a Rockford Machine Tool Co. representative to give you full details on these machines, or write direct for our new bulletin No. 900A.

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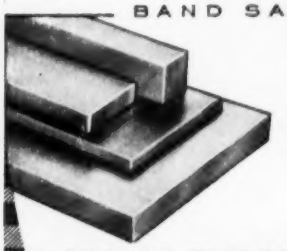
LENOX
QUALITY TOOLS

HACK SAWS

BAND SAWS



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SPRINGFIELD, MASS.

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Reduction of tap costs by as much as 50 to 75% — and more — is reported by leading metalworking firms using the B.P.S.* System. Why not get the same benefits?

HERE IS THE B.P.S.* SYSTEM:

Adopt these two simple ideas: (1) Sharpen your taps at *regular, planned* intervals and (2) Sharpen flutes and chamfers of taps to an exceptionally high degree of accuracy (possible only on Blake grinders).

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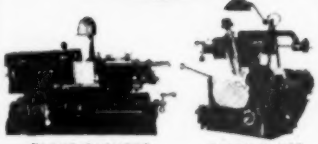
With the Blake Chamfer Grinder and Blake Flute Grinder, your operators can sharpen each tap precisely to correct any error in indexing and control the rake angle. Each tap then cuts much more accurately, more uniformly, with less strain—and its working life is greatly increased. Longer life, due to this superior sharpening method, gives far more service from every tap — greatly reduces tap costs!

*Blake Precision Sharpening

HERE'S WHAT THE B.P.S.* SYSTEM CAN DO FOR YOU!



BLAKE CHAMFER GRINDER — BLAKE FLUTE GRINDER

- Gives much more production per tap!
- Greatly reduces tap costs!
- Provides greater tap accuracy and uniformity!
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Write us for reprints of *American Machinist* and *Machinery* articles on this subject. Descriptive folders on both Blake grinders also available.

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Black Diamond Precision Drill Grinders • Waltham Cutter Sharpeners • Surface Finish Standards

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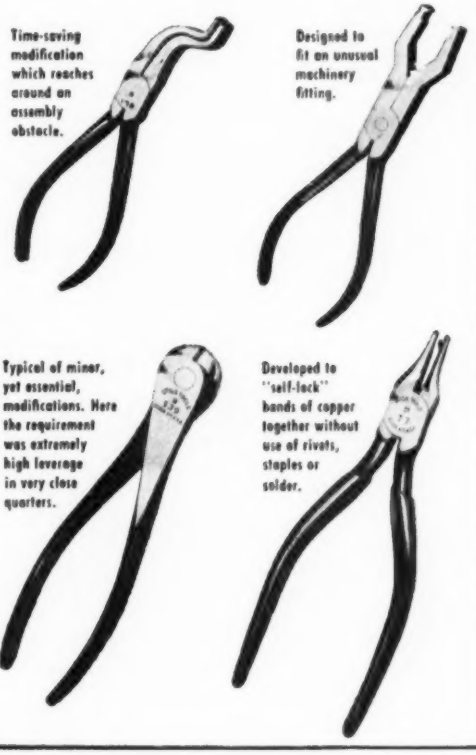
Custom Tools Like These

simplify the unusual,
solve the difficult,
and speed the slow-moving.


Time-saving modification which reaches around an assembly obstacle.
Designed to fit an unusual machinery fitting.
Typical of minor, yet essential, modifications. Here the requirement was extremely high leverage in very close quarters.
Developed to "self-lock" bands of copper together without use of rivets, staples or solder.

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Let us take over the problem. Let us send one of our sales engineers to check your production line for time-saving possibilities. Custom tools can **speed, simplify,** or ***eliminate*** an operation. Such a survey would be without obligation to you, of course.

NO ONE IS SO WELL QUALIFIED TO SOLVE YOUR SPECIAL PROBLEM AS UTICA

Address inquiries to CUSTOM TOOL DEPARTMENT

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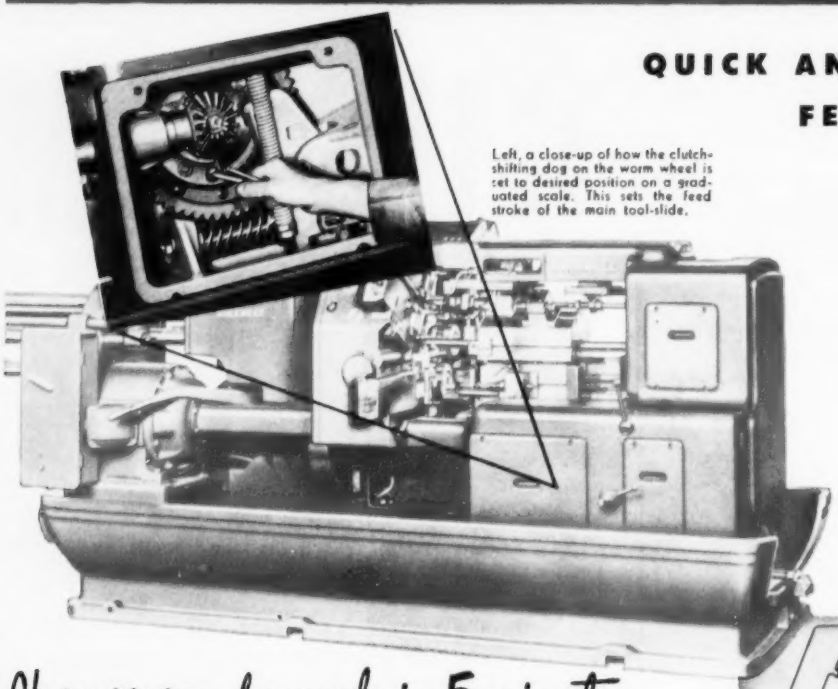
GREENLEE Automatics



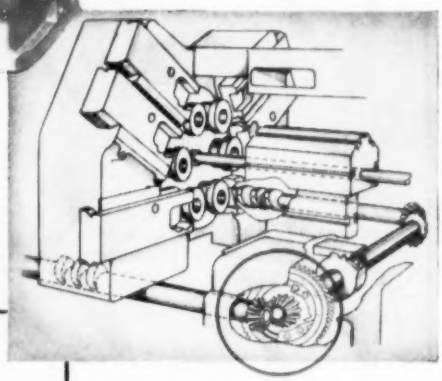
Left, a close-up of how the clutch-shifting dog on the worm wheel is set to desired position on a graduated scale. This sets the feed stroke of the main tool-slide.

QUICK AND EASY FEED STROKE ADJUSTMENT

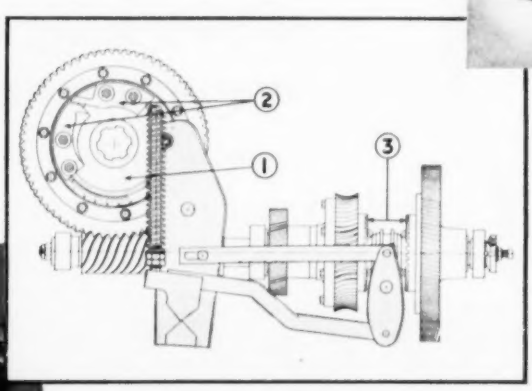
On Greenlee Automatics, main tool-slide feed stroke adjustments are made by adjusting only one dog on a graduated worm wheel, as illustrated by the inset picture at the left. The details of this arrangement, and particularly the relation of the worm wheel to the main tool-slide drive, are shown and explained in the other pictures and captions.

Changes can be made in 5 minutes

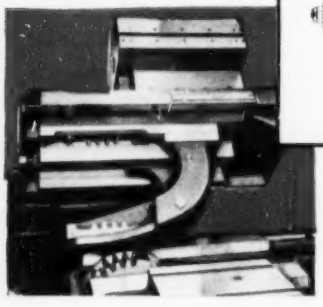
Precise adjustments of the main tool-slide stroke can be made easily in less than five minutes. To save time in making preliminary settings, two additional scales are provided, one on each side of the tool-slide, with graduations corresponding to those on the worm wheel.



The drawing at the right shows how the clutch, worm and worm wheel, and clutch shifting levers are related. Numbers indicate (1) the graduated worm wheel, (2) the clutch shifting dogs, and (3) the main drive clutch.



The cutaway diagram above shows, in the circle, the location of the graduated worm wheel on the end of the shaft that carries the intermittent feed gears.



At the left is a view of the tool-slide removed and tilted back. The intermittent feed gear provides a full stroke each cycle, with fast approach and a smooth shift into feed. The main clutch is shifted automatically.

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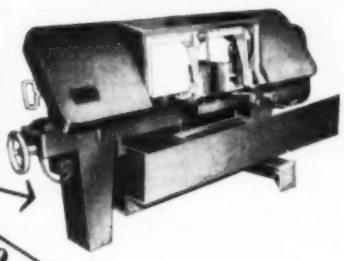
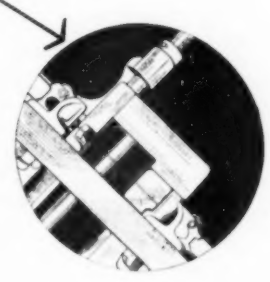
you can see the CUTTING ACTION



Kalamazoo METAL CUTTING BAND SAW



Yes . . . you can look directly down into the cut as it's being made, giving you instant warning of any need for adjustment. And blade wear and dullness can be quickly detected, too. Result? Faster, cleaner precision cutting, longer blade life.

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• The world's finest centers are RED-E . . . each type the result of engineering know how, backed up by nearly 50 years of experience. The "Shank" and the "Ball & Roller" Type centers illustrated are just a few of over 200 exclusively designed centers available.

Ask for Catalog "B" (Pipe and Bull Nose Centers), "C" (Anti-Friction Centers), "D" (High Speed—Carbide Tipped Centers).

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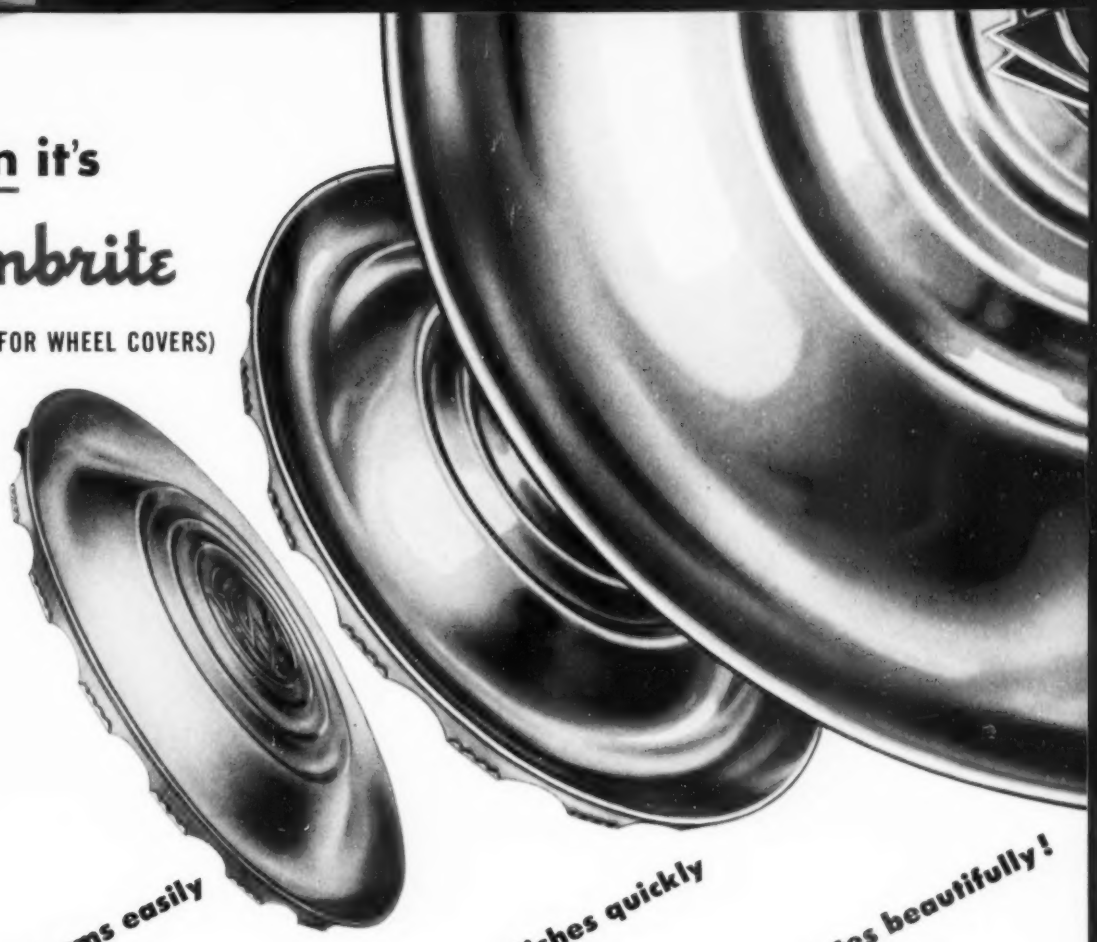
again it's Formbrite

(THIS TIME FOR WHEEL COVERS)



● it forms easily ● polishes quickly ● plates beautifully!

Canadian Motor Lamp Co., Limited, Ford, Ontario, is a large automotive parts supplier. When Canada's "Big Three" turned to full wheel covers in place of hub caps for many '53 models this supplier, suddenly facing a new set of production problems, turned to Formbrite*, exceptionally fine-grain Anaconda Brass. Here are the reasons:

1 Previous experience in manufacturing large quantities of chromium-plated brass hub caps made of Formbrite indicated that polishing operations could be reduced as much as 50%.

2 Formbrite had demonstrated its remarkable ductility for press operations—taking sharp, clean-cut, ornamental die impressions.

3 Formbrite was harder, stronger, springier and more scratch-resistant than ordinary drawing brass . . . desirable characteristics for the service involved.

4 Important, too, was the fact that Formbrite would provide the fatigue-resisting springiness to the gripping fingers that hold the cover to the wheel.

Shown above is one of the 16 sets of gripping fingers which hold the 15" diameter wheel cover to the rim. The metal is yellow brass, .024" thick, supplied in coil as Formbrite.

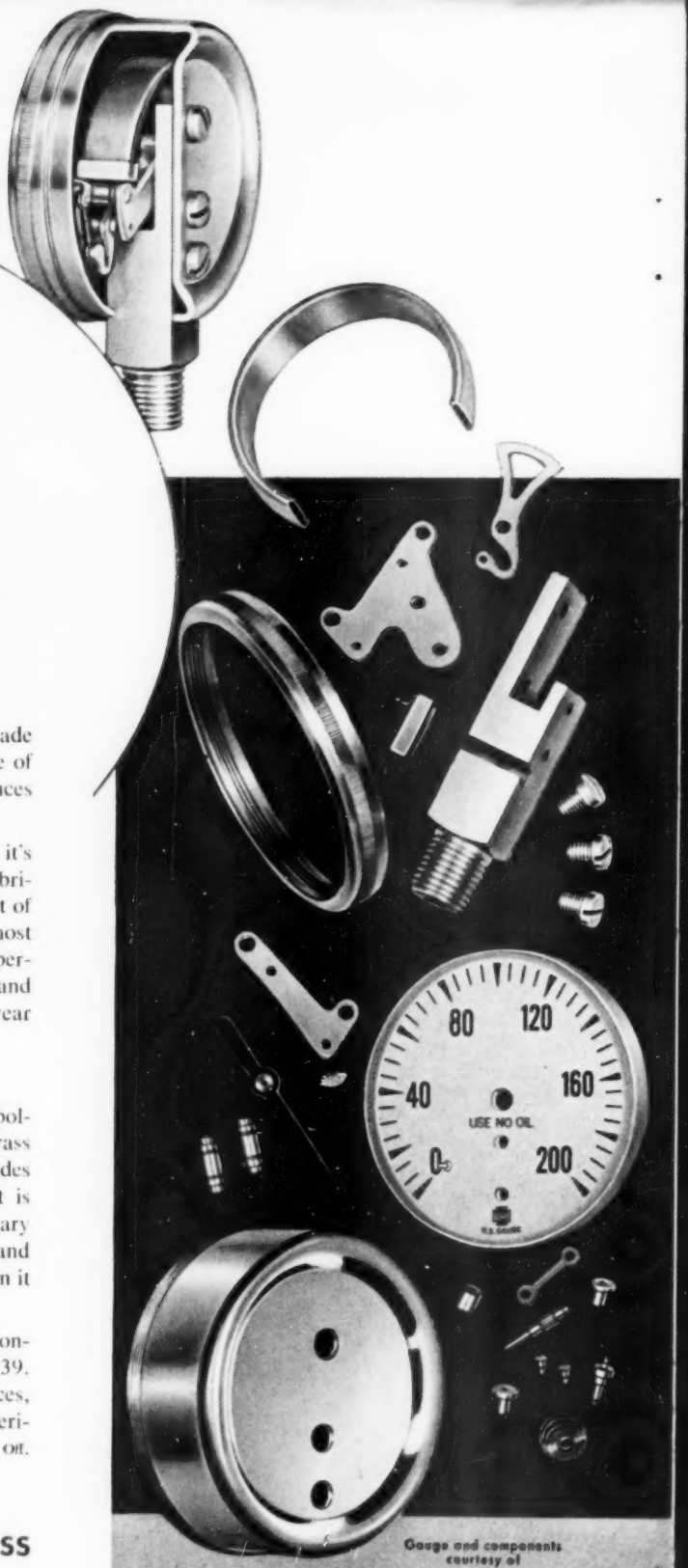
Now in full production on the new wheel covers, Canadian Motor Lamp's appraisals proved 100% correct. Maybe *you're* missing something by *not* using Formbrite. Write for Publication B-39, addressing The American Brass Company, General Offices, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Limited, New Toronto, Ontario.

*Reg. U. S. Pat. Off. 5350

Formbrite DRAWING BRASS

An ANACONDA product made by The American Brass Company

PRESSURE



It's big business at U.S. Gauge where **brass belongs**

At Sellersville, Pa., millions of pressure gauges are made each year—for every type of industry—to every degree of accuracy—and for pressures ranging from a few ounces per square inch up to 100,000 pounds.

With each gauge a precision instrument unto itself, it's quite a job to maintain the high standards of routine fabricating procedure on each of its many components. Part of it depends on having just the right copper alloy in the most satisfactory combination of chemical and physical properties. That's where teamwork between U. S. Gauge and Anaconda Metals has been clicking day after day, year after year.

and now—something NEW has been added . . .

U. S. Gauge is now using Formbrite* for many of its "polished and lacquered" and chromium plated solid brass gauge cases. Formbrite, with its superfine grain, provides a surface far superior to ordinary drawing brass. It is stronger, harder, more scratch-resistant than ordinary brass, yet retains remarkable ductility for forming and drawing. Best of all, Formbrite is a real time saver when it comes to finishing operations.

Want to know more about this "premium product at a non-premium price"? Write for Anaconda Publication B-39. Address: The American Brass Company, General Offices, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. *Reg. U. S. Pat. Off.

Formbrite DRAWING BRASS

An **ANACONDA** Product

Made by The American Brass Company

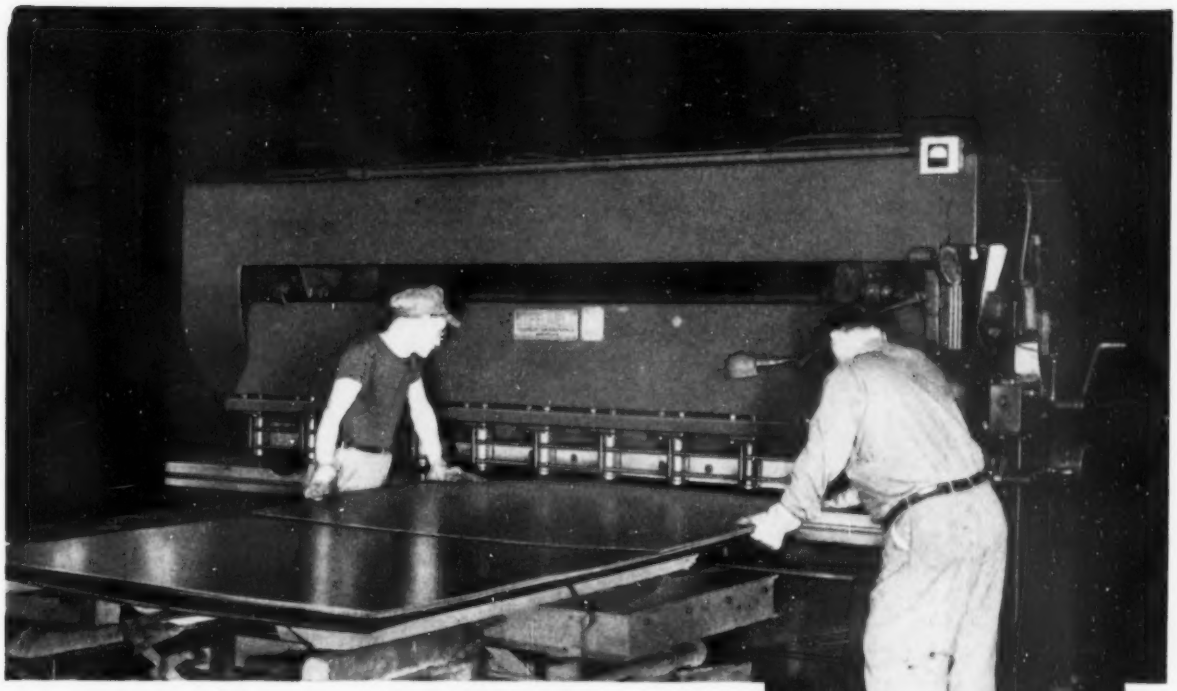
Gauge and components courtesy of

UNITED STATES GAUGE

DIVISION OF AMERICAN MACHINE AND METALS, INC.

Sellersville, Pa.

For the ultimate in precision, eleven different Anaconda Alloys in the form of rod, tube, sheet and strip are used in producing the components of the U. S. Gauge illustrated above.



High Production Shearing is done at The S. K. Wellman Co., Cleveland, with this No. 110 Steelweld Shear.

For High Production Shearing **STEELWELDS are "TOPS"**

"What makes Steelweld Shears tops?", you ask. "Why are they so outstanding for high production shearing?" Here are some reasons:

1 EASY, FAST OPERATION Electric foot control, standard on Steelwelds, enables shearing speeds not attainable with ordinary mechanical foot treadles. Easily operated by a mere touch of the toe, it can be moved on floor to wherever most convenient.

2 SMOOTH, CLEAN CUTS Unusually smooth, clean cuts are obtained because of Steelweld's exclusive pivoted-blade cutting action. The upper knife travels in a circular path and pulls away from lower knife immediately after shearing. This prevents binding of cut pieces between back gauge and knife. Knife wear is reduced

3 QUICK, SIMPLE KNIFE ADJUSTMENT Best possible cut for any thickness plate can be made, because of Steelweld's exclusive Micro-Set knife clearance adjustment which can be made in a few seconds.

4 CONVENIENT, ACCURATE BACK GAUGE Before the gauge at rear of an ordinary shear can be reached, a Steelweld back gauge is usually set and the machine in operation, because the adjustment is on the outside of frame near front where conveniently reached. Ball bearing equipped, it is easily operated and accurate.

5 MAXIMUM PRODUCTION Steelweld Shears are built for heavy-duty high production work. The one-piece welded steel frame and all operating details are liberally designed to provide extra stamina. Servicing is simple. All parts are easily accessible. As a result, downtime is minimum and production maximum.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

1431 EAST 282nd STREET, WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS

Symbol of 1600 hands that know how

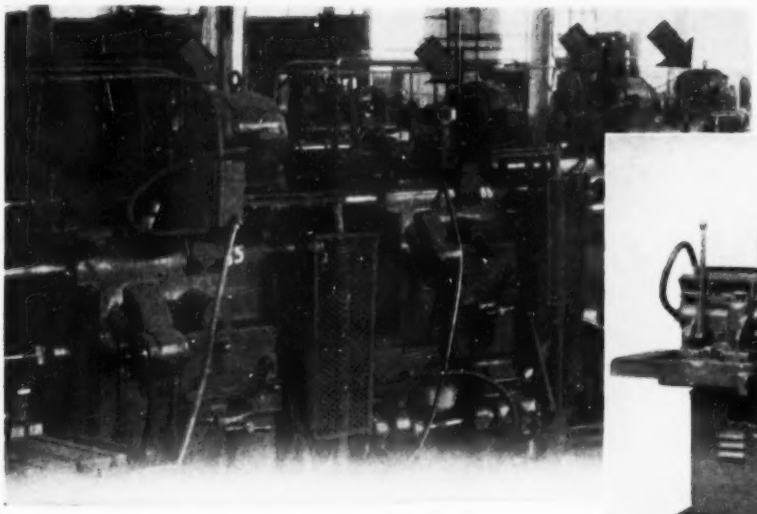
Hands pledged to a common cause — hands that are skilled at their job and devoted to building top quality into every weldment. Hands of the metallurgist, of engineers and management — most important, hands that do the welding, the shaping, the machining and the inspecting — these are the hands that spell out the meaning of AWQ — American Welding Quality.

We know of no better guarantee of quality than a skilled worker with a sincere desire to do his best. This is the know-how, the care, the quality that American Welding offers you.

If your products involve either fusion or resistance welding of ferrous or non-ferrous metals, let us study your problem. We can apply over a third of a century's experience to your requirements — backed by 1600 hands that know how.

A company you'll like to deal with

THE AMERICAN WELDING & MANUFACTURING COMPANY • WARREN • OHIO



Four Century 5 horsepower squirrel cage motors operate milling machines

Century 5 horsepower motor driving a grinder

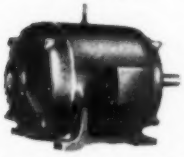
Century

TYPE SC-
SQUIRREL CAGE MOTORS

⅛ to ¾ horsepower

1 to 1½ horsepower

2 to 15 horsepower



20 to 125 horsepower

150 to 400 horsepower

Equipment Producers Select Century Motors

To Give You Long-Life Performance With Least Down-Time

The correct selection of the right combination of motor type, speed, power, torque, frame and mounting keeps Century motors on the job; reduces production headaches.

Team work between your motorized equipment producers and Century motor engineers means that you always get the right motor—selected from Century's wide range of types and kinds, in sizes from ⅛ to 400 horsepower for single or polyphase alternating current and direct current. You can be confident that you get top performance from the fine equipment these motors drive.

Skillful application makes sure that Century motors meet the exacting requirements of the machines they drive. That's your assurance of dependability.

CENTURY ELECTRIC CO. 1806 Pine St., St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

Century Electric Company is celebrating its 50th year in the electrical industry.

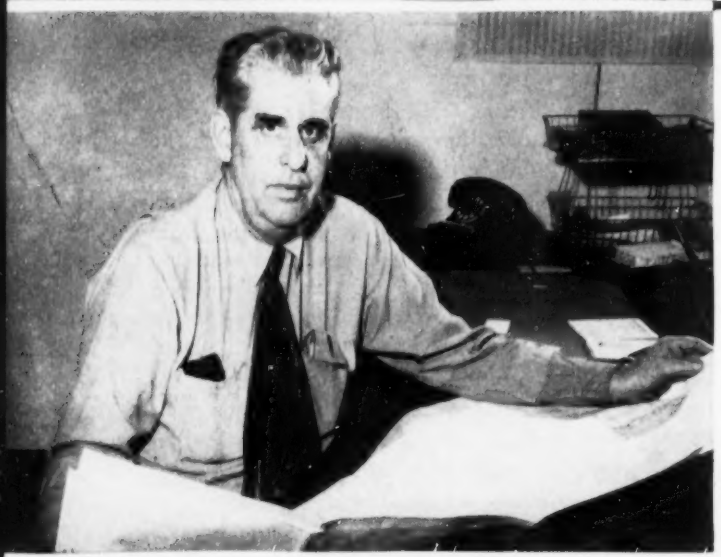
CE-690M

Specify Century C MOTORS for all your electric power requirements

Cutting Metal?... "SKIL Saw saves 9 hours, pays for itself on first job!"

says **Alton J. Hofstad,** manager, **Kolstad Co.,** Minneapolis, Minn., *largest truck body builder in Minnesota*

"A recent order for 13 trailers required cutting corrugated aluminum," says Mr. Hofstad. "Cutting by hand was a ten-hour job. We tried a SKIL Saw Model 825 with an aluminum-cutting blade and finished in one hour. The saw paid for itself on this first job! In addition, we are using four SKIL Disc Sanders, ten SKIL Drills and two SKIL Drivers."



"SKIL Tools outlast all others,"

says Superintendent E. Livingston

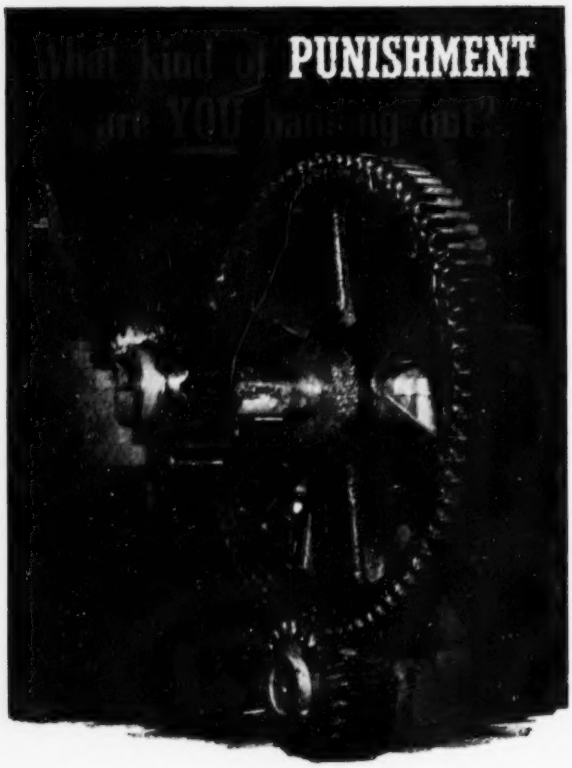
Twenty-five years in this business makes Mr. Livingston an authority on power tools. He states, "I have used SKIL tools for *many years* and know first hand of their excellent performance, durability and the many savings they give in reduced production costs. When we started this firm, we bought SKIL tools and other makes. Hard use burned out the others, but SKIL had what it takes. I specially like the slow speed model SKIL Drills for slower speeds and maximum power," he concludes.

PHONE, WRITE OR SEE YOUR SKIL DISTRIBUTOR OR NEARBY SKIL FACTORY BRANCH FOR COMPLETE INFORMATION

"You Can See the Cut with a SKIL Saw," says Robert Myhre as he cuts through extruded aluminum. "That's all-important for accurate work, most of all in tough cutting like this."

"Every Day, 400 Holes Drilled on This Job," says Harold Otte, using a Model 47 SKIL Drill on oak slats in a truck body. "I like SKIL balance and ease of handling in tight corners and hard-to-reach spots."

SKIL



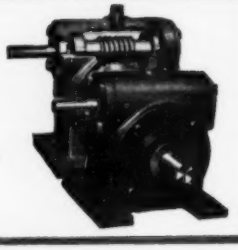
Dust? . . . dirt? . . . vibration? . . . sudden load changes? . . . 24-hour operation?

It takes a *good* gear to stand up under the tough punishment found in industry today. And Grant — thanks to over 70 years of experience — makes *only* good gears. So when you're faced with a really tough gear problem — call on Grant for a fast, economical solution.

Grant Gears are made in standard and custom types from ¼" to 72" in diameter. Hundreds carried in stock at all times. Send prints or specifications for quick quotation.

Look to Grant for *gear units*, too . . .

. . . hundreds of types and sizes available from stock — write for bulletin



Grant GEAR WORKS INC.

75th ANNIVERSARY

169 W. Second St.
So. Boston, Mass.

YOU WRITE THE SPECIFICATIONS

Our job is to furnish Adams Gears exactly as you want them. Highest quality is assured through close control over every detail of manufacture. The Adams Company, 1942 Cypress Street, Dubuque, Iowa.

the ADAMS line . . .

SPUR GEARS	INTERNAL GEARS	SHAVED TOOTH
BEVEL AND	(Spur and Helical)	GEARS
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WORM GEARS	LEAD AND FEED	WORMS
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ESTABLISHED 1882

GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS

ACME QUALITY GEARS

Always Meet Specifications

For twenty-five years Acme Gears have been giving unsurpassed service in industrial, automotive, marine and aircraft equipment.

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SUPPLEMENT SC-2

Every sprocket user will want this new, up-to-the-minute 48-page book of buying information on . . .

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New LOWER prices, based on larger volume, and on engineering and production economies, mean substantial savings for all sprocket buyers, whether typical order is large or small.

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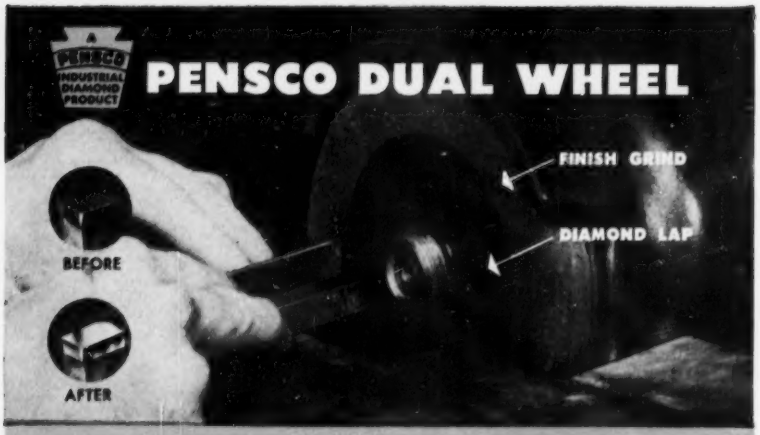
for the new Sprocket Catalog Supplement SC-2 or write: Boston Gear Works, 60 Hayward St., Quincy 71, Mass.



NEW, PRACTICAL SHARPENING METHOD...
FINISH GRIND AND DIAMOND LAP!

CARBIDE...STELLITE...HIGH SPEED

Sharper cutting edges . . . Increased tool life . . . Economical . . . Accurate . . . Easy to use . . . Fast cutting . . . Adaptable to all tool grinders.

After rough grinding in the usual manner, tool faces are finish ground dry on the 120 grit silicon carbide vitrified bond grinding wheel section of the Pensco Dual Wheel. Then, in a matter of seconds, the tool is diamond lapped on the Pensco phenolic resin insert charged with Spectrum Diamond Lapping Compound (diamond paste) of the desired grit size. A U.S. Standard #30 (600 grit) is usually preferred. This reduces the surface finish of the cutting edge from 15 to 20 mu R.M.S., after finish grind to 1 to 2 mu R.M.S. after diamond lapping. The results are superior to those obtained with diamond wheels.

Pensco Dual Wheel Kit

Microphotographs show finish grind on 120 grit diamond wheel (left) and diamond lap with 600 grit (right)

The Pensco Dual Wheel is supplied complete in a convenient kit with a 5 gram tube of Spectrum Diamond Lapping Compound, choice of any standard grit size. Also included is a 4 oz. bottle of diamond lapping oil with atomizer applicator, wheel lap charging roller and complete directions for use. The complete kit is priced at $69.50. State grit size desired when ordering.

For complete information write:

PENN SCIENTIFIC PRODUCTS CO.
5941 ALMA STREET, PHILADELPHIA 34, PA.

From the *American Machinist* Library of *Tips for Top Shop Men*

THERE'S an old saying that "If you want to be big, you've got to look big." Nobody likes a fourflusher or a fop, but everybody has been trained from childhood to expect a leader to look like one. Company policy can't earn respect on the major things either, if it is small on the minor things. Don't make your company look small.

The 1954 PRODUCTION PLANBOOK *for Metalworking*

The 1954 PRODUCTION PLANBOOK will be the first of a continuing new service, made available to you each year *at no additional cost*, as a 27th issue in your regular subscription to *American Machinist*. You will find the PRODUCTION PLANBOOK to be the most lastingly useful working reference you have. Expect your copy in mid-November.

Featured in the PRODUCTION PLANBOOK, and bringing you significant facts and figures *available nowhere else*, will be the new *American Machinist* inventory of Metalworking Production Equipment. Another important division will be a thorough analysis of various methods which have been devised (including the MAPI Formula) to enable you to decide when it is wise and profitable to replace an old piece of equipment or machinery with a new, more efficient one.

Other sections of the PRODUCTION PLANBOOK will present an authoritative picture of the market outlook for next year . . . and you'll get plenty of valuable information and useful ideas from a big section of case histories of successful modernization programs in many different plants.

American Machinist
McGraw-Hill Building
New York 36, N.Y.

Sizing the Grain—

• Modern metallurgical techniques are a far cry from those of yesteryear. Today we know that a fine, even-grained metal offers the greatest wear and longest service. In gear making we know that proper induction hardening, for instance, produces an homogeneous, nodular structure which gives maximum strength from minimum size materials.

• It is important for us to know before a gear blank is machined, and after a gear is hardened, if metal structures throughout meet specifications. So here in BRAD FOOTE'S testing laboratory we check the grain structure on a Metallograph. The technician sees a greatly magnified view and actually counts the grains per square inch.

• This may be getting down to the finer points in quality gear manufacturing. But it is your assurance that BRAD FOOTE'S engineers and technologists have at their disposal every scientific tool needed to make better gears for your every use. It's the reason why we can say *"No one shares our responsibility."*

• Next time you need gears, gear-motors, speed reducers, or transmissions, let us quote to your specifications; or tell us the job to be done and we'll design and engineer what you need. You pay no more at BRAD FOOTE, but we think you get more—lots more. We'd like to prove it to you.

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Get production off to a profitable start! Use Columbus Die-Tool engineered tools. Jigs, Fixtures, and Special Machinery individually designed and built to produce your product alone . . . at a rate to match your production schedule. That's production economy! That's the wisdom of CDT special machinery! That's how Columbus Die-Tool can put your production on a profitable basis. Columbus Die-Tool are specialists in building special tools, jigs, fixtures and machinery . . . have been for over 46 years. Talk over your special problems with us. Absolutely no obligation. Write today.

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ESTABLISHED 1906

Manufacturers of
JIGS • FIXTURES • BUILDING MACHINE TOOLS COMPLETE
SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

"Packaged Precision"

Measures high-precision holes to fractions of .0001", with these advantages

Here in a compact self-contained unit, you have the high precision that has found so prominent a place in the jet engine program. By unique design, Comtorplug gives true 2-point gaging, self-aligned and centered. Thus it enables you to check any part of a hole—including very bottom—detecting out-of-round, front or back taper, bell mouth, etc.

- There are no gimmicks to get out of order, such as wiring, hose or electronic gear. And because self-contained Comtorplug has none of these, and no heavy base, it is instantly usable anywhere: machine, bench, or lab.
- Shows actual measurement to fraction of .0001", and is "just right" for Statistical Quality Control programs.
- No skill needed to use it accurately—built-in features and 10 minutes' instruction do the trick.
- Marvelous thing about Comtorplug from production man's viewpoint is that you can put it to work in your shop without any planning, wiring, air lines or rigmarole—just a simple briefing on its use.
- Comtorplug is a rugged, shockproof instrument. Use it for size control at the machine as well as bench inspection, wherever you produce precision holes in volume.

REQUEST BULLETIN 46

COMTOR CO.
68 FARWELL STREET
WALTHAM 54, MASS.

They're still talking in shops that use

J&L "1200"

COLD FINISHED STEEL

Shop records keep proving the logic of using **J&L "1200"** COLD FINISHED STEEL in terms of

SUPERIOR MACHINABILITY

HIGHEST QUALITY FINISHES

DEPENDABLE UNIFORMITY

EXCEPTIONAL EFFICIENCY

from machines and operations

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH

The list of shops making J&L "1200" Cold Finished Steel a permanent specification keeps growing. Production records prove—again and again—that here is a new, free-cutting steel with exceptional machinability and uniformity.

There are two things you should do today:

1. Obtain complete information concerning J&L "1200" Cold Finished Steel.
2. Try J&L "1200" Cold Finished Steel in your production line.

Here's a booklet that will help you . . .
SEND FOR YOUR COPY TODAY!

Jones & Laughlin Steel Corporation
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I'd like a copy of your booklet "J&L 1200 Cold Finished Steel."

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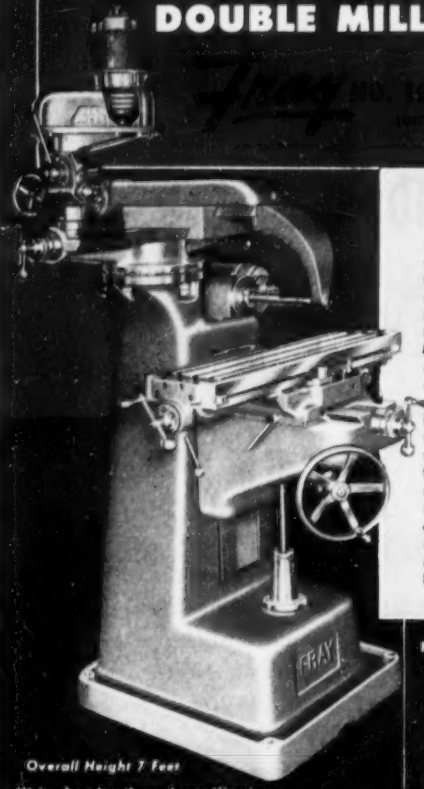
FRAY TOP SLIDES
DOUBLE MILLING RANGE

Fray NO. 10RH MILLING MACHINE
UNIVERSAL ELEVATING TYPE



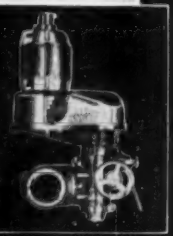
Overall Height 7 Feet

Write for details and specifications . . . Request Bulletin # 10

A Fray pays bigger production dividends by performing an unequalled range of milling operations. Both of the top slides on the Fray 10 RH are easily adjustable. This feature permits alignment of the turret slide with the table, *thus doubling longitudinal and cross milling range* . . . or you can just as simply set the turret at an angle to the table and mill in two directions. Combined, the turret slide and table slide provide 38" of overall travel, while the table cross slide, plus the ram slide permits a full 18" of in-and-out adjustment. This equals the overall range of much larger machines. Fray moves precision work faster at less cost.

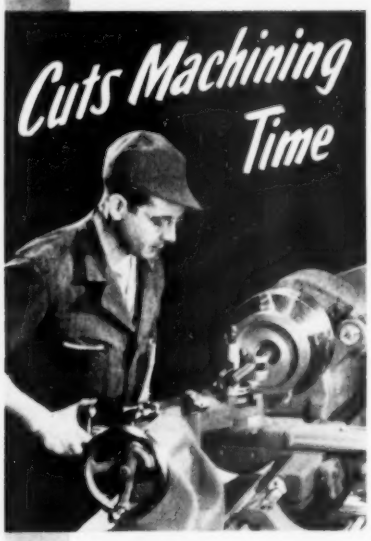
Fray "All-Angle" Head TYPE 4

For deep, heavy cuts. Permits working to extra close limits. Any angle up to compound 2-way. Request Bulletin 4.



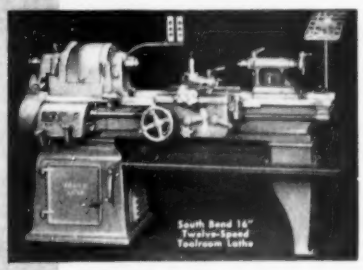
All-Angle

FRAY MACHINE TOOL CO.
515 WEST WINDSOR ROAD, GLENDALE 4, CALIFORNIA



SOUTH BEND
12-SPEED LATHE

The wide range of spindle speeds on this new lathe cuts machining time because the operator quickly selects the right speed for each operation. Pushbutton control provides a fast change from any high speed to the corresponding low speed. Its 48 longitudinal and cross feeds assure maximum efficiency on every job. Also, you will find that its accuracy and ease of operation make your tough jobs easy. Send for catalog.



SPECIFICATIONS

Spindle Speeds (approx.) Direct: high range 300, 550, 945; low range 150, 278, 475. Back gear drive: high range 32, 70, 118; low range 20, 33, 60.
Spindle Bore — 1⅜".
Swing over bed — 16¼".
Swing over saddle cross slide — 9⅝".
Distance between centers — 33¼", 45¼", 57¼", 81¼", 105¼".
Collet Capacity — 1" maximum.
Thread Pitches — 48, 4 to 224 per inch.

SOUTH BEND LATHE
SOUTH BEND 22, INDIANA
Building Better Tools Since 1906

SOUTH BEND LATHES

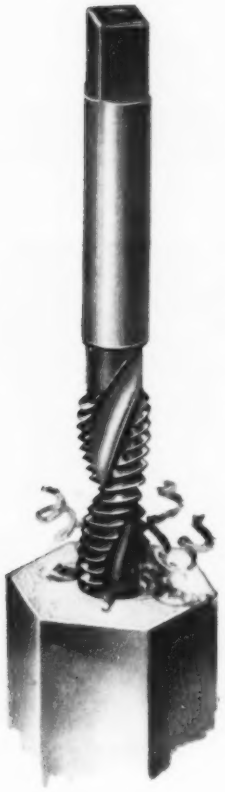
The LINLEY JIG BORER

Put your small jig boring jobs on this precision machine

Here's a machine, available at extremely low cost, that will enable you to save your larger machines for larger, heavier work. You'll find it meets your most exacting requirements for precision. Get our accuracy information and you'll see what an outstanding investment this machine represents.
Table movement: 6" x 10"; table size, 7" x 17½".

Send TODAY for complete information

LINLEY BROTHERS CO.
664 STATE ST. EXT., BRIDGEPORT 1, CONN.



What do *you* look for in a Tap, Mr. Johnson?

That will be "*performance-ability*" . . . something that you cannot see at first glance.

This has been built into the tap through proper selection and heat treating of the tap material, and the precision processes of machining the tap . . . processes that challenge the statement so often heard, "taps are all alike." That's why it pays to specify —

Hanson-Whitney...

The Hanson Process is the original method of *finishing after hardening*. Through this process, Hanson-Whitney has for 34 years produced a quality line of finished precision taps to the complete satisfaction of our customers. We have never manufactured cut thread or unfinished taps in our years of serving the metalworking industry. This is our assurance to you of the highest quality of precision threads and accurate finish throughout.

Yes, Mr. Johnson, you're bound to say that Hanson-Whitney Taps give you dependable day-in, day-out production performance . . . performance that is proven on your cost sheets. Of course, the right tap for the specific job is essential.

Ask the Hanson-Whitney representative for his recommendations.

the **HANSON**
Threading Processes
Offer Complete
Coordinated
Responsibility
for
The Machine Tools
The Cutting Tools
The Measuring Gages

HANSON-WHITNEY DIVISION of the WHITNEY CHAIN CO.

160 Bartholomew Avenue, Hartford, Connecticut, U. S. A.

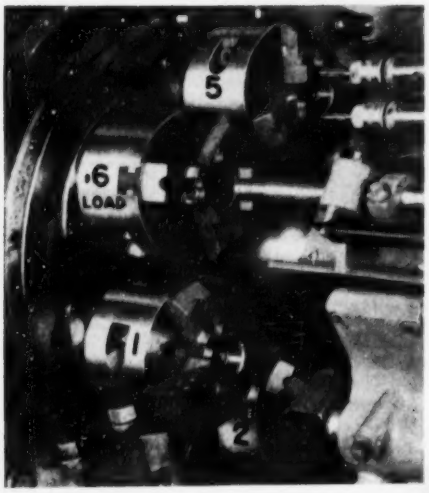
Our Mr. Johnson is a composite character typical of the thousands of experienced practical machinists throughout the country. You, too, have a Mr. Johnson in your shop . . . ask him what he thinks about Hanson-Whitney Taps.

3HW83A

ASK **BAIRD** ABOUT IT!

HIGH PRODUCTION TOOLING

A BAIRD CASE HISTORY



View of machine from front.

1
Finish turn flange O.D. (3.44"). Rough turn hub dia. Rough face flange and hub.

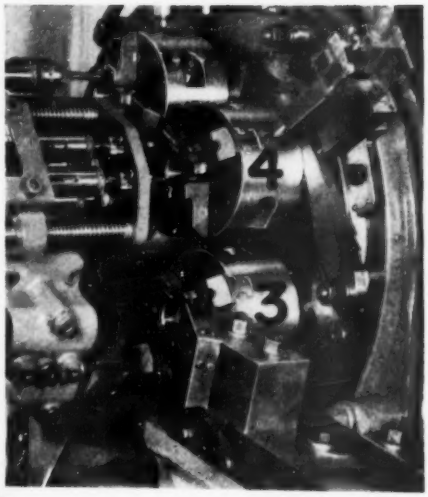
2
Chamfer I.D. Chamfer flange dia. and hub.

3
Finish turn hub, finish face flange and hub.

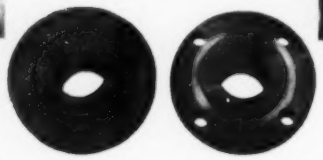
4
Drill and c'sink 4 holes — 23/64" dia. drill x 29/64" dia. C'sink, sub land drills. (Work held stationary when drilling.)

5
Tap 4 holes 7/16" — 14NC — 3. (Work positioned, held stationary, lead screw operated.)

6
Unload and load.



View of machine from rear.



The part . . . before and after machining.

FINISHING A CAST IRON PULLEY HUB...

PRODUCTION

Cycle time 23.12 seconds per piece.
Gross production 155 pieces per hour.

Here's another example of the way a single Baird High Production Machine can be tooled to handle a series of operations ordinarily not considered practical on a single spindle automatic unit. Note that, in addition to the usual concentric operations being performed on this hub, we are drilling, countersinking, and tapping accurately located bolt holes in the hub flange at just two stations in the cycle and at a very satisfactory production rate for the whole operation. Photographs show the tooling and relative simplicity of the set-up.

And, as in the case of all Baird No. 76 Chucker installations, this one is conspicuous for smoothness and dependability of everyday performance. Automatic chucking frees operator's hands for efficient, easy feeding. Automatic safeguards prevent damage to work, machine, or injury to operator in case of incorrect loading. Spindle speeds are independently adjusted to best performance of the individual operation.

To step up speeds, quality of work, reduction in costs, check the Baird Chucker. "Ask Baird about it."

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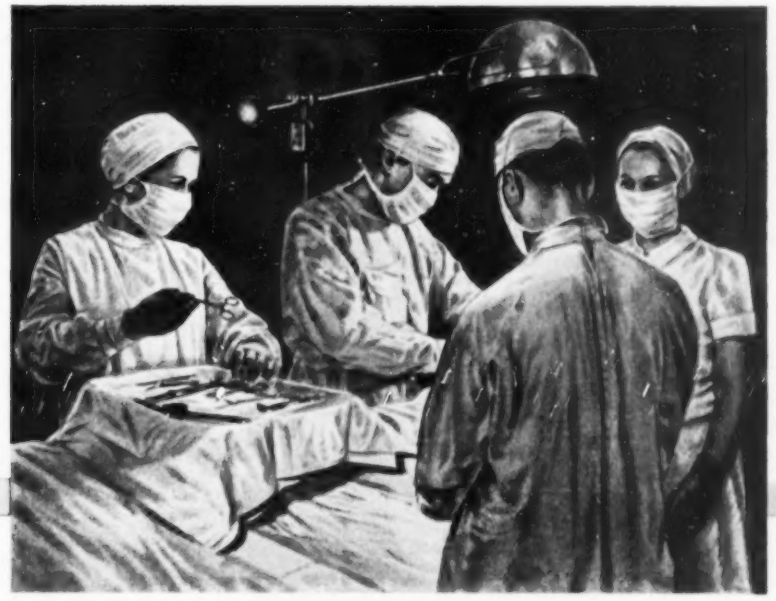

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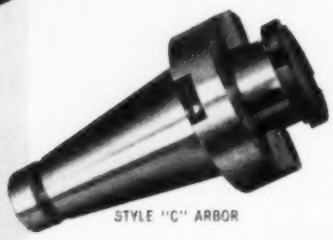

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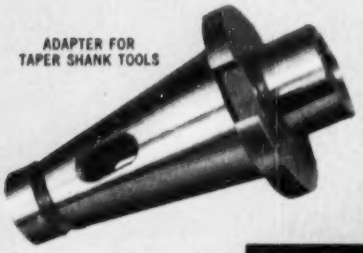

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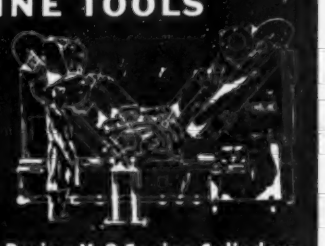

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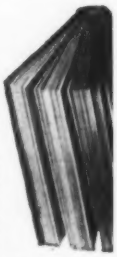

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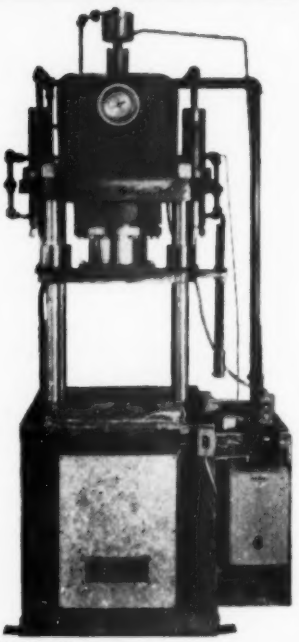

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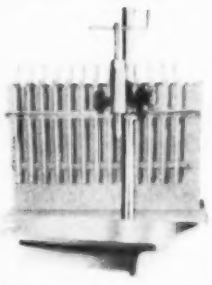

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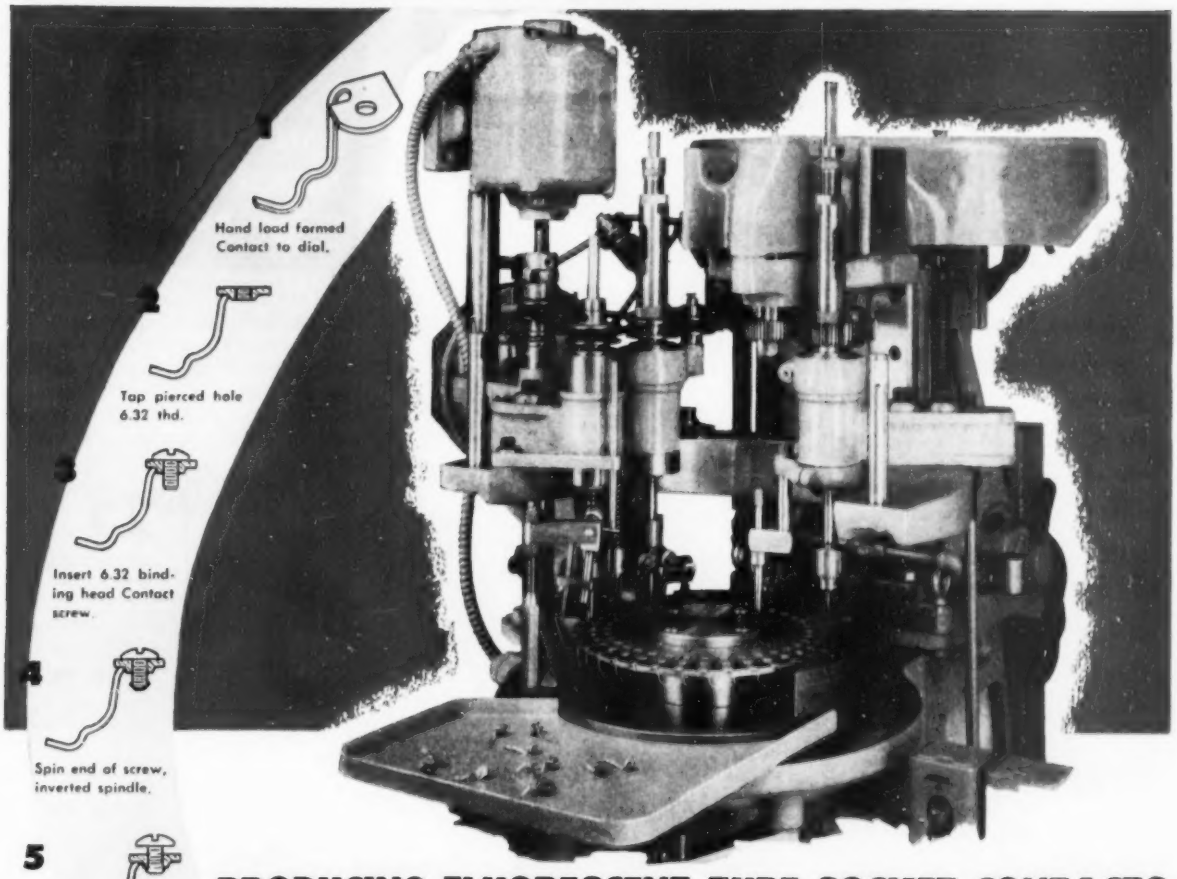

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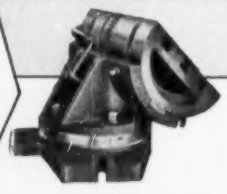

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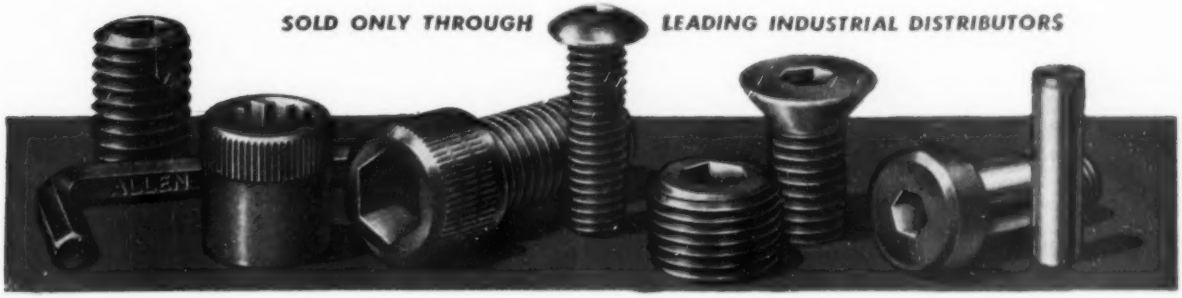

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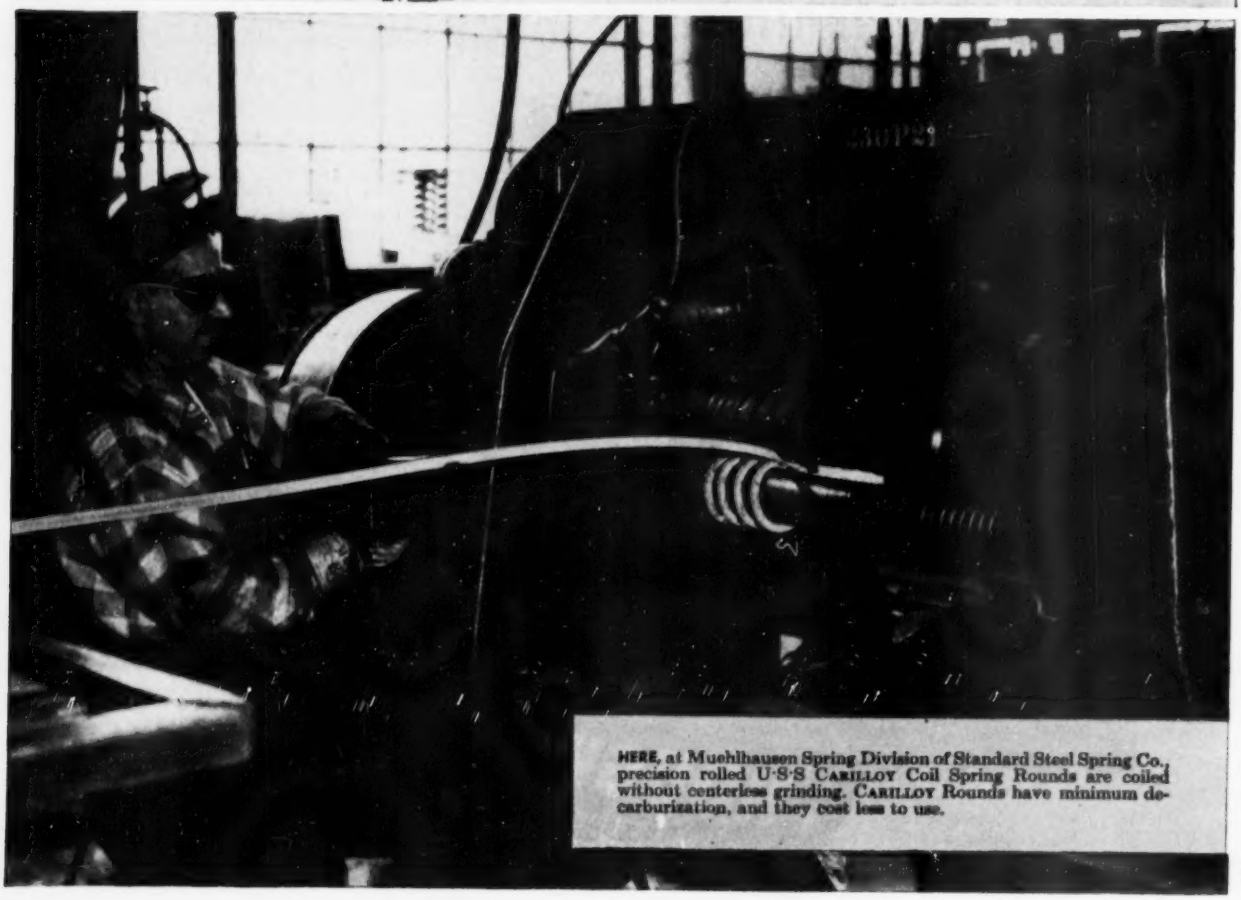

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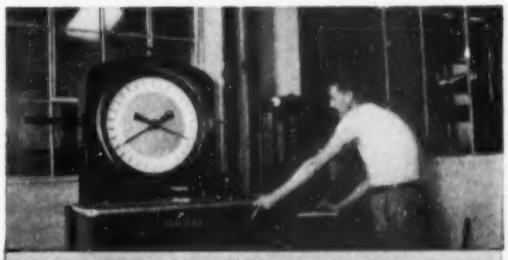

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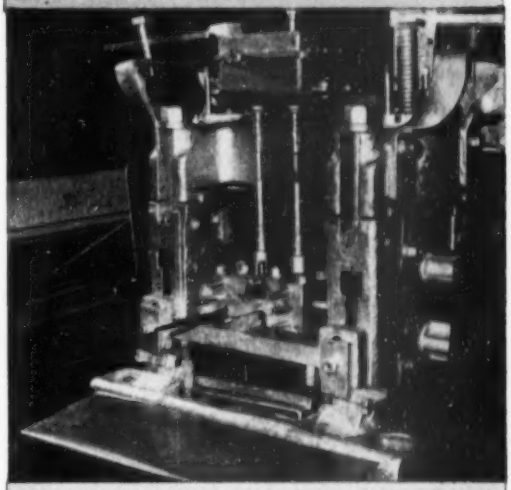

AT THE GARY WORKS of United States Steel, this precision mill rolls CARILLOY Coil Spring Rounds with extreme accuracy. Tolerances are half of standard; .004" on the diameter, instead of the usual .008", and only .006" out of round, compared to .012" on ordinary rolled bars.

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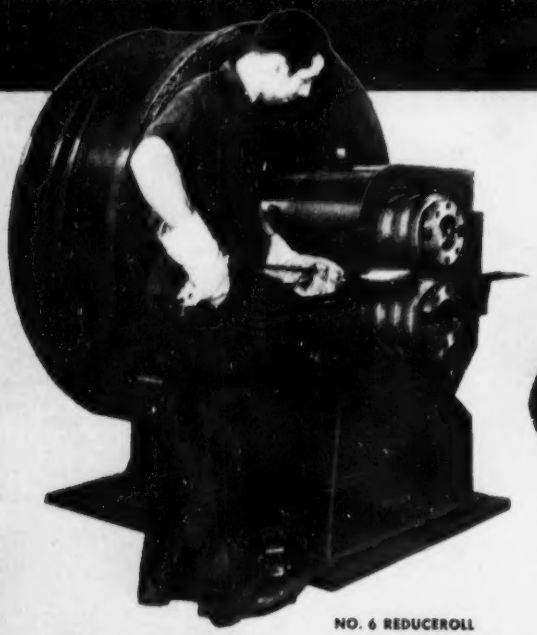
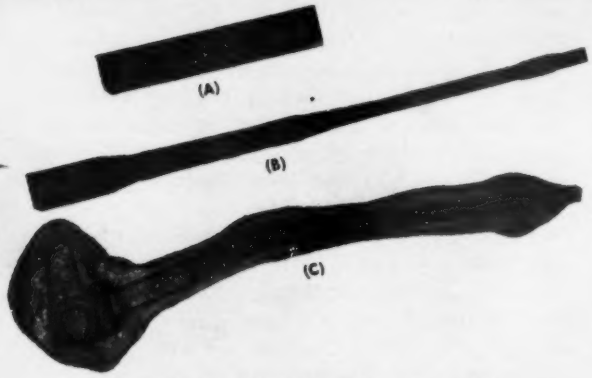


NO. 6 REDUCEROLL



At Canada Foundries and Forgings Ltd., Welland, Ontario, the clutch pedal forging illustrated above, was *formerly* forged as follows: Stock was heated and upset in a 3" upsetter, then reheated and finish-forged in a 2500 lb. hammer. These operations required a crew of five men.

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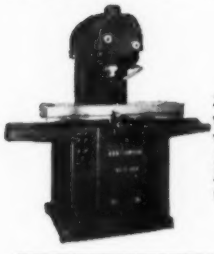

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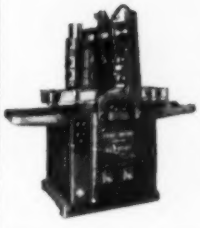
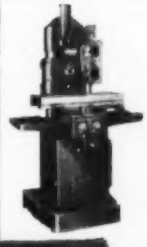


No. 2-20DS
Double Spindle for two milling operations at same time... 20" table travel . . . 42" x 12" table.

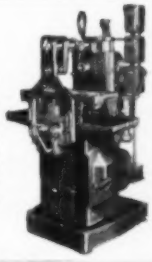
No. 1-14DS
Double Spindle for two milling operations at same time . . . 14" table travel . . . 32" x 9" table.

No. 1-M
Hand feed to table and head . . . 25" x 9" table . . . Adjustable head counter-balance.



No. 1-V
Hydraulic vertical head feed... 5¼" head travel . . . 25" x 9" table.

No. 1-8
8" table travel . . . 25" x 9" table . . . automatic hydraulic table feed.



No. 1-14
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

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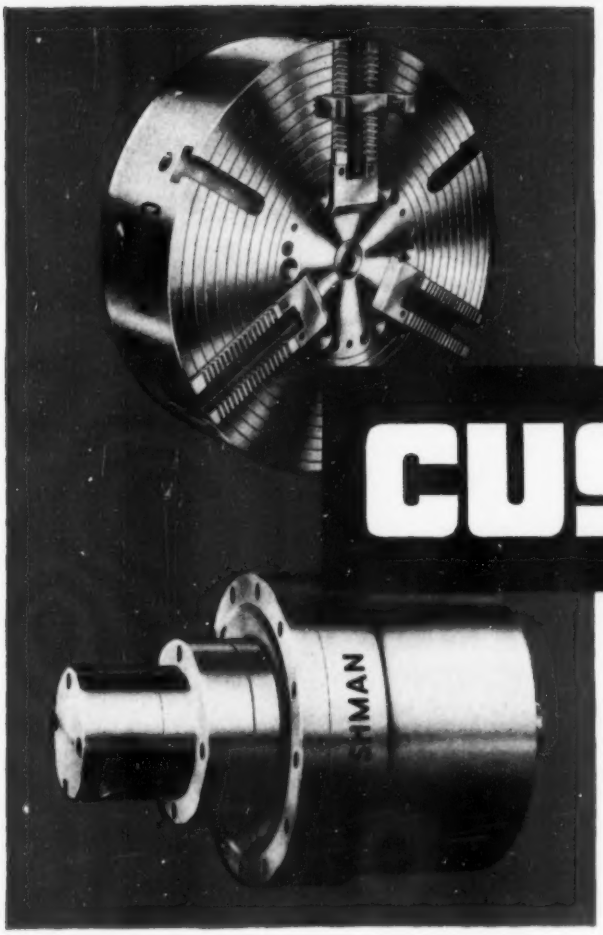

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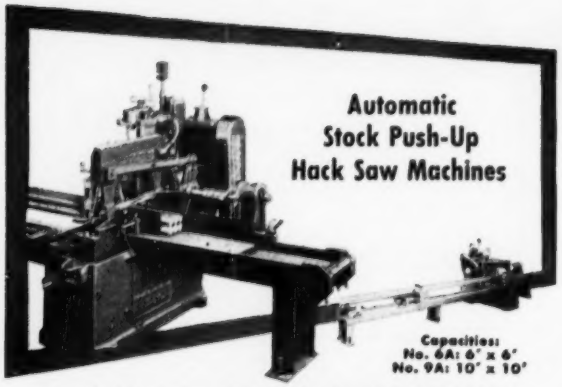

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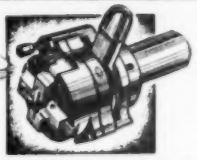

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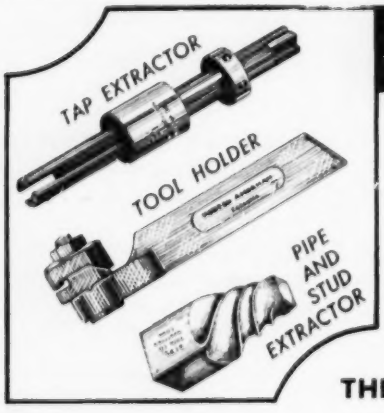

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The fable of

The Three Brothers

HOLDS A LESSON FOR CUTTING FLUID USERS

THREE brothers inherited equal shares of their father's farm. One brother feverishly worked his land, with seldom a rest, until prematurely worn out, he died at an early age. The second brother loafed and played until his land went to ruin and he died for want of food. The third brother, wiser than the other two, *balanced* his work and play, so that he prospered mightily and lived to a ripe old age.

The Lesson

BALANCING cutting fluids produces best results, too. The *proper balance of chemical activity* will provide the longest possible tool life consistent with surface finish desired.

Figure 1 shows abnormal front clearance wear of a single point tool due to *excessive* chemical activity of the cutting fluid used. The tool failed prematurely, just like the first brother in the fable.

Figure 2 shows abnormal cratering of a tool due to *insufficient* chemical activity of the cutting fluid used. Such cratering is usually associated with poor surface finish. This tool failed prematurely like the indolent brother in the fable.

Both of the above examples of tool failure were developed under identical conditions, except for the degree of chemical activity of the cutting fluids used.

The *proper balance of chemical activity* gives the most profitable results. For the right cutting fluids for your work, ask to have your Stuart Oil Representative call. Use the handy coupon below.

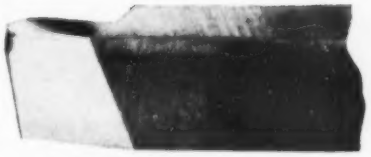

FIG. 1—Abnormal front clearance wear caused by excessive chemical activity of cutting fluid.

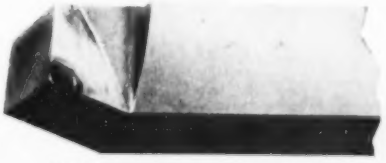

FIG. 2—Cratering of cutting tool, usually associated with poor finish, resulting from insufficient chemical activity of cutting fluid used.

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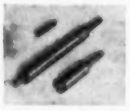
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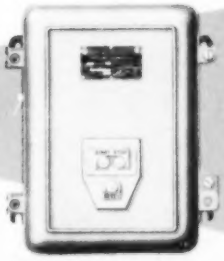
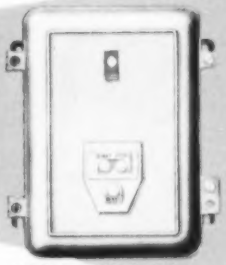
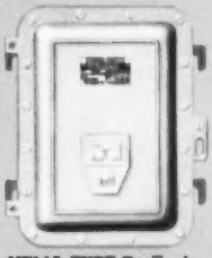


NEMA TYPE 9. Explosion resisting for hazardous dust locations. Cast iron enclosure.

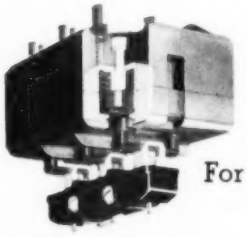


NEMA TYPE 4. Watertight. Cast iron enclosures.



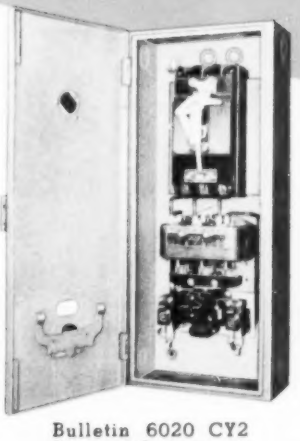
NEMA TYPE 7. Explosion resisting for hazardous gas locations. Cast iron enclosure.

Type 5 Dust Tight, Fabricated Steel enclosures, with Gasket and Wing Nuts.

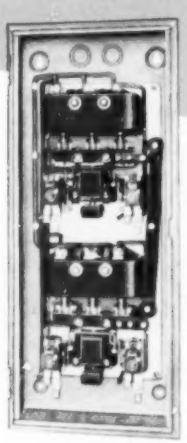


Cutaway View of Arc Box Showing Steel Encased Arc Chamber, Twin Blow-Out Coils and Contacts.

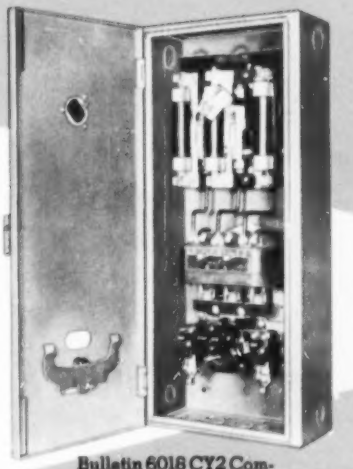
Style-wise, CLARK TYPE "CY" STARTERS are available in Sizes 0-1-2-3, in enclosures finished in Machine Tool Gray, set off by a piquant touch of Red, Yellow and Black on nameplates. For every industrial atmosphere there's a fitting enclosure. Sizes 2 and 3 have the revolutionary arc quenching principle which combines strong multi-turn magnetic blow-outs with twin break contacts.



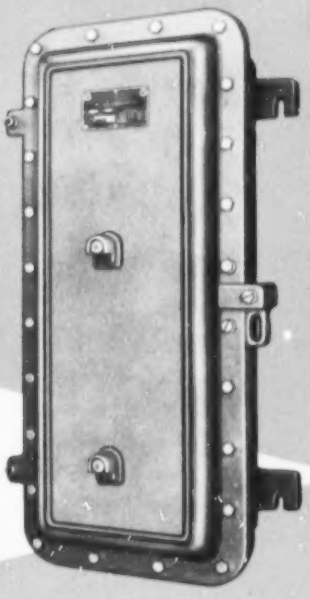
Bulletin 6020 CY2 Starter with air circuit breaker, in Safe-Edge Cabinet.



Bulletin 6050 CY2 Starter Two-speed double winding Consequent-pole starter in Safe-Edge Cabinet.



Bulletin 6018 CY2 Combination Starter with fusible safety switch, in Safe-Edge Cabinet.



Type 7 Cast Iron, explosion resisting enclosure for hazardous gas locations. A multi-speed starter.

(B)

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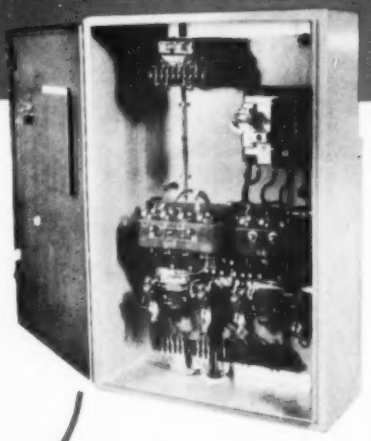
CLARK TYPE CY

STARTERS and CONTACTORS
make ideal applications for machine tools



Clark Type "CY" Starters and Contactors are successfully combined with Relays, Disconnect Switches, Circuit Breakers, Transformers, Timers and other control devices to provide maximum service with minimum maintenance and downtime. Long contact life is provided by the famous "CY" Arc quenching principle, in which strong multi-turn magnetic blow-outs are combined with twin break contacts. Records of millions of operations with no noticeable contact wear are common.

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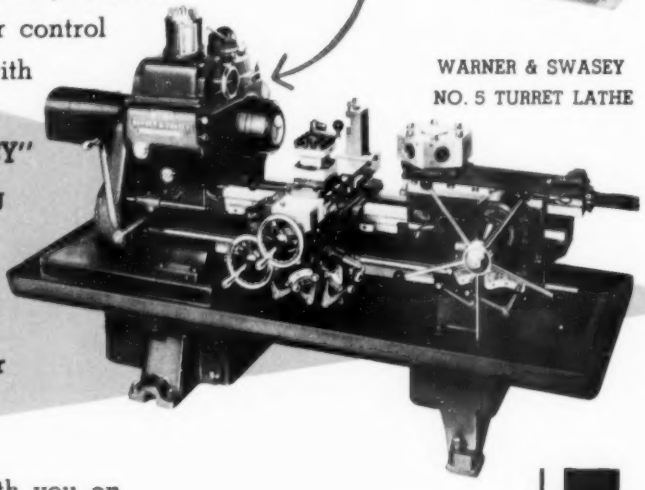

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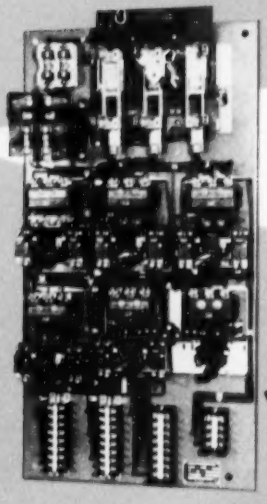

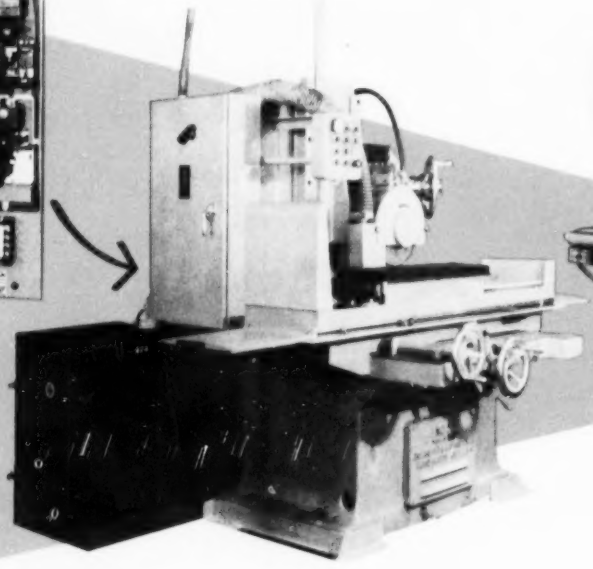

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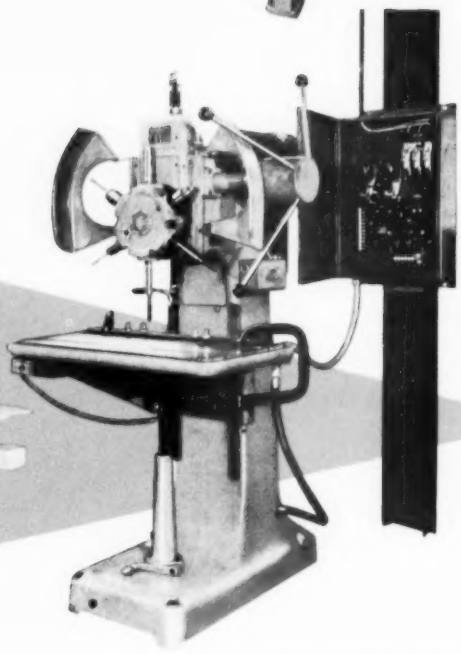

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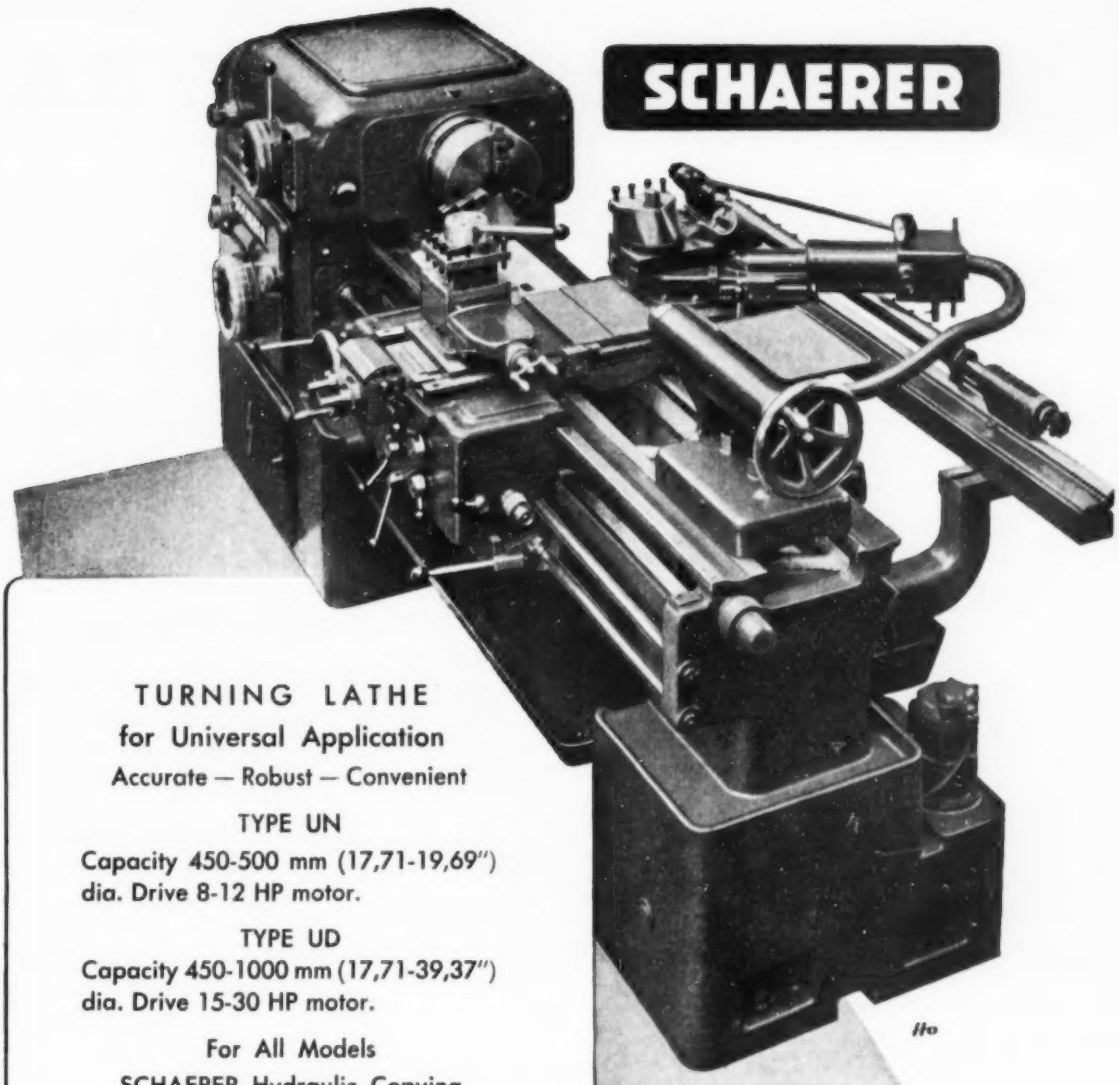

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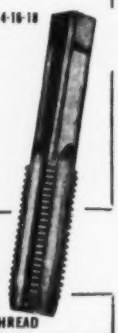
4	32-40-48-64
5	30-32-36-40-48
6	30-40-48-56-60
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	28-28-32-36
14	5/16 28-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40

SIZE	THREAD
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-28-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1 3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5-1/2 - 8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24

SIZE	THREAD
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4-1/2-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-18
2-1/4	4-1/2 - 8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	8
4	8-12



HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32-40
1/4	20-28-32
5/16	18-20-24-28-32

SIZE	THREAD
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18

SIZE	THREAD
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1 11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4-1/2 - 10-12

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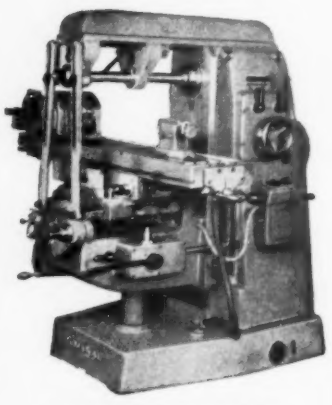

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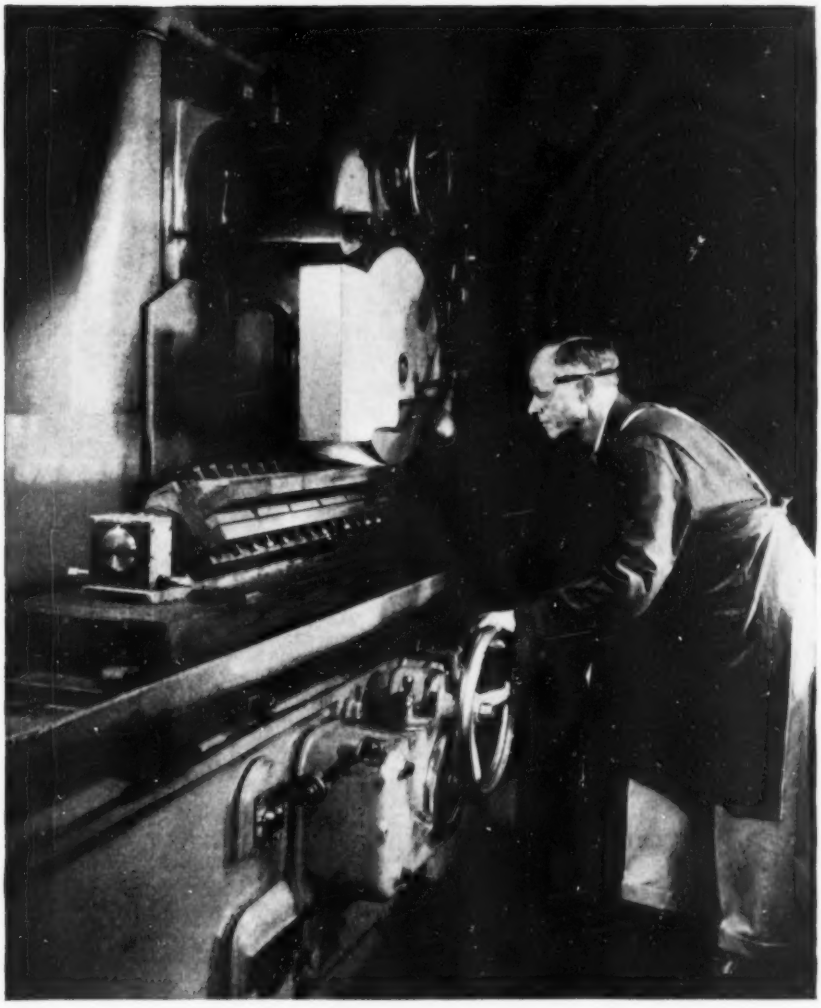

Mattison Grinder beats old time (15 hours) by 12 hours

The picture above shows a punch and die grinding operation on a Mattison High-Powered Precision Surface Grinder at Lyon Metal Products, Incorporated. Previous time on a converted planer-grinder was 15 hours — now with a Mattison Grinder equipped with special fixture, grinding time has been reduced to 3 hours.

Mattison Grinders are proving profitable investments in plants where "time out" for reconditioning is a vital factor in meeting production schedules. Surfaces are reconditioned and edges sharpened in a minimum of time, eliminating costly delays and holdup of production. Many manufacturers installing the Mattison Grinder for reconditioning dies find many other uses for it in grinding flat surfaces where accuracy and fine finish are required For complete information on the Mattison High-Powered Precision Surface Grinder, send for free copy of our latest circular.

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You Can Cut All Metals At Less Than 4 SEC. Per Square Inch

LOOK AT THESE TYPICAL CUTTING TIMES			
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	COLD ROLLED STEEL	2½" Dia.	15 Seconds
	HIGH SPEED STEEL	2" Dia.	9 Seconds
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	STEEL PIPE	2" O.D.	3 Seconds
	ANGLE IRON	3x3x¼"	5 Seconds

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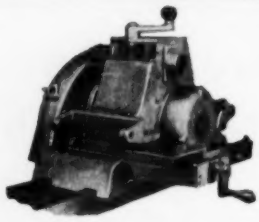
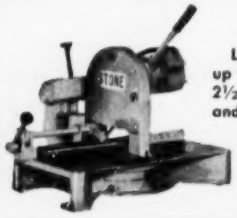
MODEL M-75
HEAVY DUTY

For continuous production cutting of solids up to 2½"—pipe and structurals up to 4". Equipped with full 7½" h.p. geared-in-head motor engineered with positive drive for 33% greater efficiency.

MODEL SS-20
TRAVERSE TYPE

Operates in horizontal plane on guided rails for cutting larger structurals, extrusions, sheet, plate with cuts up to nine feet in length. Cuts wet or dry.





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Low cost machine for cutting solids up to 2"—pipe and structurals up to 2½". Two models—straight cut-off and swivel head for angle cutting to 45°. Bench or floor model. Equipped with full 3½ h.p. geared-in-head motor engineered with positive drive.

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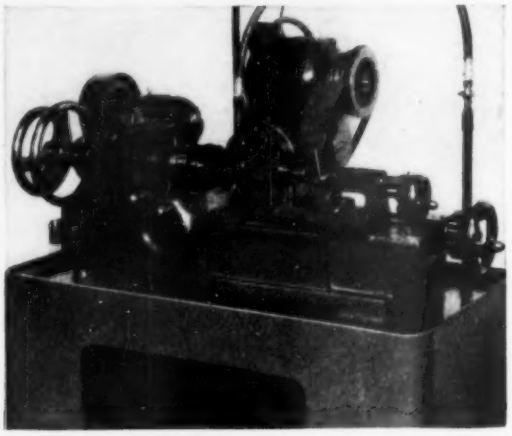

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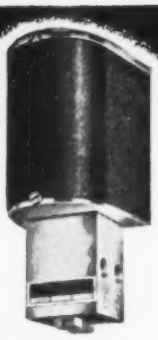

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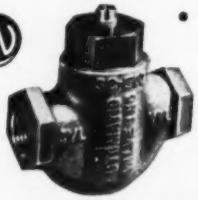

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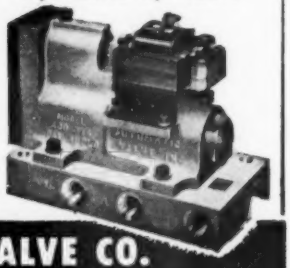

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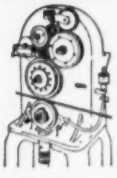

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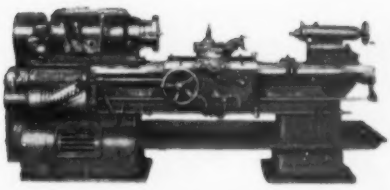

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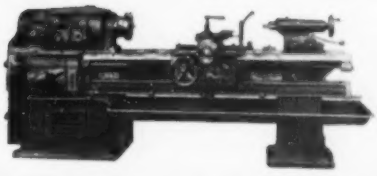

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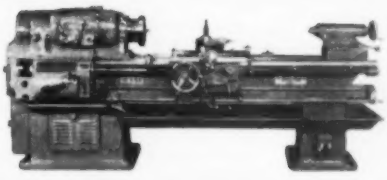

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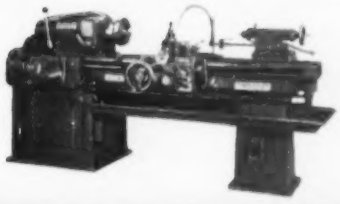

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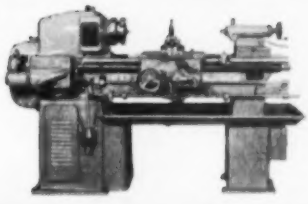

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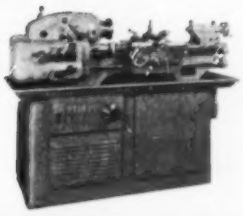

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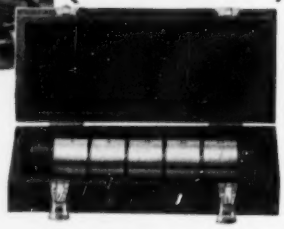

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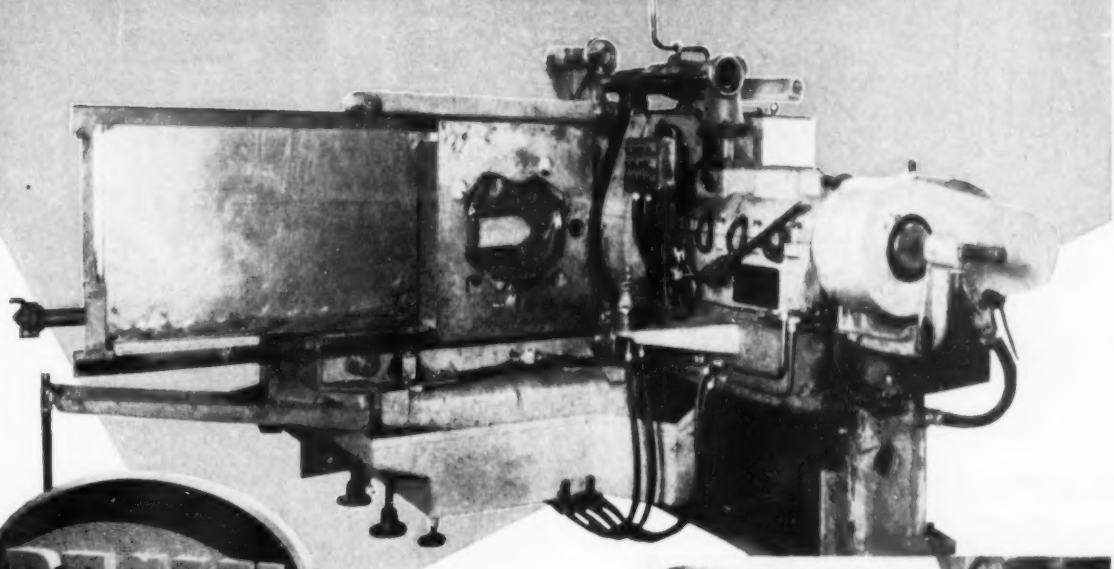

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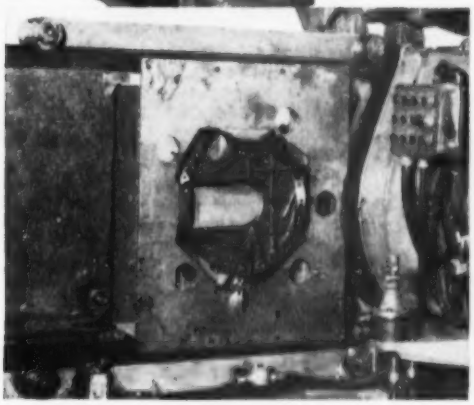

At a production rate of one a minute, this specially designed Model 226-30″ Double Spindle Besly grinds *both sides of torque converter plates at the same time.* With stock removal of .020″, accuracy is .003″ for parallelism and .006″ for size.

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SPECIFICATIONS

Model	Size	Tool Capacity
P-60	0	1/8 to 5/16
P-61	1	5/16 to 3/8
P-62	2	1/4 to 1/2
P-64	4	5/16 to 5/8

Specify left or right hand offset

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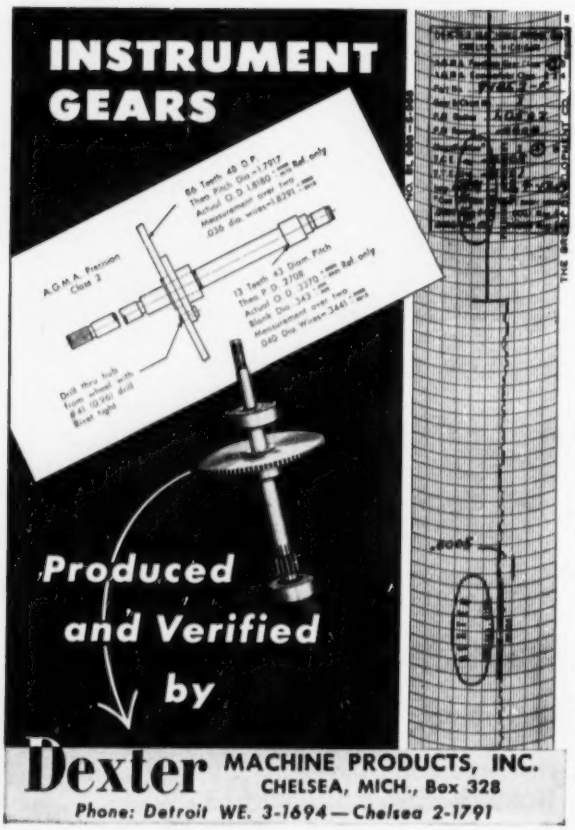

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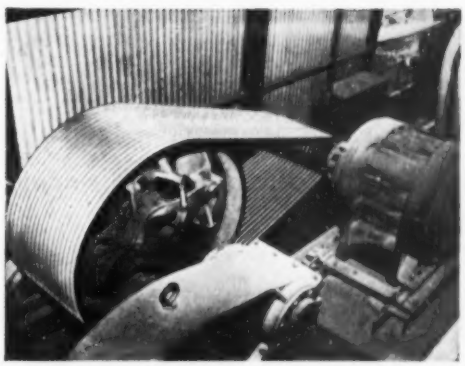

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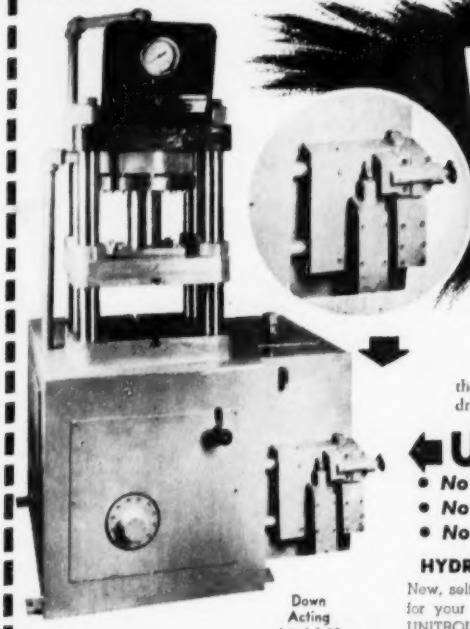

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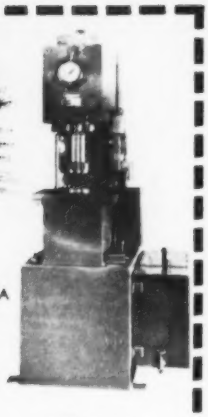

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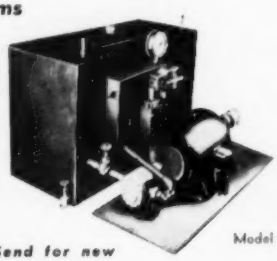

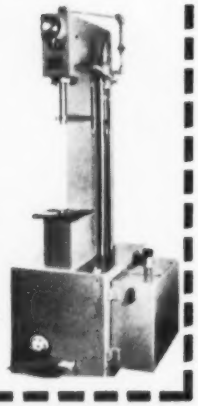

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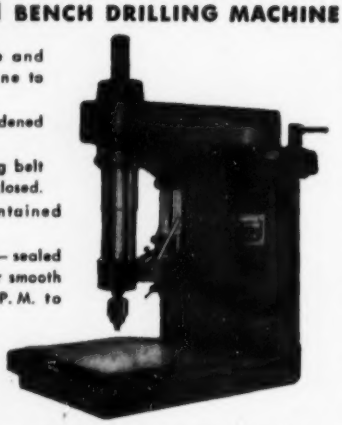

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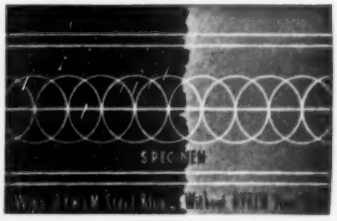

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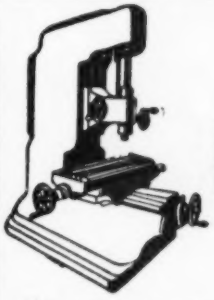

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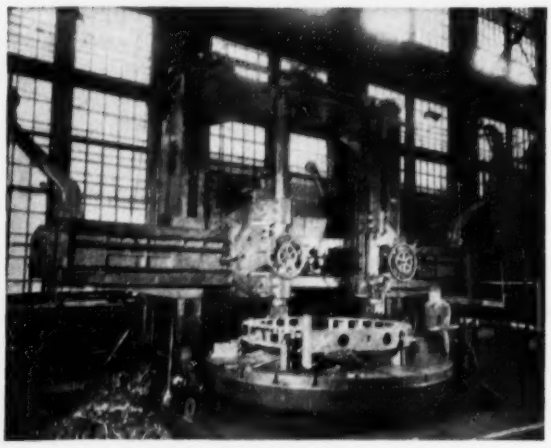

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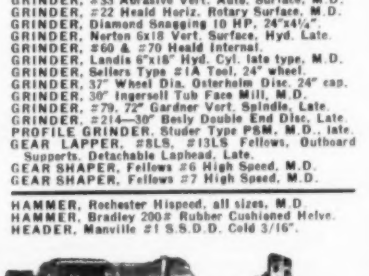

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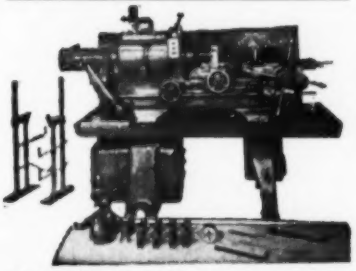

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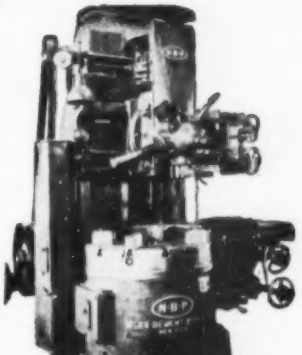
LATHE, Hendey 12"x5' Q.C.G. Taper Attach. M.D.
LATHE, LeBlond 14"x6', Q.C.G. M.D.
LATHE, Hendey 14"x8' Q.C.G. Taper Attach. M.D.
LATHE, American 16"x6' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 18"x7' Q.C.G., M.D.
LATHE, American 18"x19' Q.C.G., Grd. Hd.
LATHE, South Bend 18/28"x8' Gap Bed, Q.C.G. M.D.
LATHE, Reed-Prentice 20"x10' Grd. Hd. M.D.
LATHE, LeBlond 22"x10' Q.C.G., M.D.
LATHE, 24"x10' Axelson Grd., Late, M.D.
LATHE, 24"x12' Boye & Emmes Grd. Hd., T.A., Late.
LATHE, Putnam 23/32"x12' Q.C.G., M.D.
LATHE, LeBlond 24"x14' Q.C.G., Grd. Hd.
LATHE, Lodge & Shipley 26"x14', Q.C.G., M.D.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, 22"x16' Niles Tilmesaver, Grd. Hd., M.D.
LATHE, Bridgeford 32"x16' Q.C.G., Grd. Hd.
LATHE, 42"x18' Pittsburgh Geared Head, M.D.
LATHE, Buffing Dble. End #VMT5, Davine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret, #2 Simmons Vari Drive 220 V.
LATHE, Turret #2 W & S Univ. Grd. Hd., Late.
LATHE, Turret, #4 Warner & Swasey Univ. 1½".
LATHE, Turret #6 Warner & Swasey Grd. Hd. Ram Type, Bar Feed, Motor in base.
LATHE, Turret #2 Cincl. Acme Univ. Geared Head.
LATHE, Turret, #3A Warner & Swasey Univ. M.D.
LIFT TRUCKS, 1 & 2 ton, Platform & Fork.

MILL, No. 1 U. S. Hand Mill, M.D. Late.
MILL, #4 Burke Motor Driven, Late, M.D.
MILL, #2 Pratt & Whitney Prod. Duplex, M.D.
MILL, 2M Cincinnati Univ. Horiz. M.D.
MILL, #3VB Hardinge Vert. Bench, M.D.
MILL, #4B Brown & Sharpe H.D., Horiz. M.D.
MILL, #14 Garvin Plain Horiz., M.D.
MILL, #0 V Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cincl. Horiz. #3, #4, #5 High Power, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #0-8 Cincl. Vert. Prod. Late, M.D.
MULT-MILLER, U.S. Tool #MM-1-6 Auto. Prod.
MILL, #0 Douglas Plain Horiz. M.D., Coolant.
MILL, #0 Sundstrand Rigidmil Hyd. Late Type. Vert. Hd.
MILL, #0 Vernon Hand Mill, M.D., Late.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILL, 2M Cincinnati Univ. Horiz. M.D.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILL, #3 Cinc. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #2 Vert. M.D. Brown & Sharpe.
MILL, #3 Cincl. Vertical Hi Power, M.D.
MILL, #5C Becker Vert. Die Sinker, M.D.
MILL, 42"x36"x12" Ingersoll Planer Type, 4 hds.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen. Electric, 100 K.W.
NIBBLER, #136 Savage 36"x3/16" Cap., M.D.
NAILING MACHINE, No. 16—48"-54" Morgan, Late.

THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL, 7½x11 Hanson-Whitney, Univ.
THREAD MILL, 6x14 Pratt & Whitney No. 1105.
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, Late.



36" x 44" Niles Vertical Boring Mill, Side Head, Motor Driven.

#40A Lees-Bradner Automatic Chucking Thread Mill, Motor Driven, Late Type.

PAPER SHREDDER, No. 10 Mitts & Merrill, M.D.
PLANER, Cincinnati 30"x30"x12' A.C., M.D.
POWER PRESS, Bliss #164 Open Back, M.D.
POWER PRESS, Bliss #3A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x26" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #163-B Straight Side Dble. Crank 45 tons, M.D.
PRESS, D72 & DG73 Ferracute, Redraw, M.D.
PRESS, #2½ & #6 Toledo, OBI, Motor Driven.
PRESS, #5 Johnson OBI, 56 tons, new.
PRESS, #7 & #8 Johnson OBI 79 & 90 tons, New.
PRESS, 135 Ton Clearing Single Crank 8" Str., Late.
PRESS, 70H & 125PA Drake Hyd. Arbor, New.
PRESS, Federal #2 O.B.I. Grd. 2" Stke.
PRESS, Bliss #18, #19, #20, #21, OBI, A.C., M.D.
PRESS, Waterbury-Farrel High Speed 60 tons #3W.
PRESS, 68 C Bliss Double Action, 3 crank.
PRESS, Lucas 15 tons Power Arbor, M.D.
PRESS, #68 Whitney Deep Thr. 24", foot.
PRESS, P2, P3 Ferracute M.D. Roll feed.
WHEEL PRESS, 600 ton Niles Bement Pond, A.C.
PANTOGRAPH, #1A Gorton M.D. Engraving.
PUNCH, #46 Buffalo Forge Vert. Cap. 1"x1⅝" M.D.
PUNCH, R-4 Wiedemann Turret, 10 Stat. 24" thr.
PUNCH, Hecker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Spls. End, 24" Thr. 1" thru 1".
PUNCH, H & J #4, 48" thr., with Shear Blades.

RIVET SETTER, ⅜" cap. Penn. Tubular Rivet.
ROLLS, Bertsch Pyramid 18'x1¾" cap., M.D., Late.
ROLLS, #1 Buffalo Forge Wrapping, M.D.
ROLLS, 72"x½" Lown Initial M.D., New.
ROLLS, #2 Buffalo Forge Vert. Angle, Bending, New.

COLD SAW, Wagner 10"x10" cap., M.D.
COLD SAW, Espen-Lucas #706, 48" dia. blade, M.D.
CUT-OFF SAW, Yates-American #M-90, M.D.
SAW, #4B Marvel Hack Saw 6"x6" Cap., M.D.
SAW, #20-C Racine Shear Cut 6"x6" cap., M.D.
SAW, 10"x10" Racine Hydraulic, Late Type, M.D.
SAW, Band Tannewitz GH-36" High Speed, M.D.
SHAPER, 16" Pratt & Whitney Crank, M.D.
SHAPER, 20" Rockford Univ. M.D., Tilting Table.
SHAPER, G & E 24", high duty, back geared, M.D.
SHAPER, 32" Cincl., B.G., Motor Driven, H.D.
SHAPER, Morton, 36" Draw-Cut, 4 speed M.D.
SHEAR, 6' x 14 ga. Parker M.D., Late Type.
SHEAR, #26 Buffalo Forge Slitting Armor Plate.
SHEAR, Quickwork #11 Rotary 60" Throat, 10 ga.
SHEAR, 10' x 10 ga. Wysong & Miles, M.D., New.
SCREW SLOTTER, #2 Waterbury Farrel Auto.
SLOTTER, 12" New Haven Vertical M.D.
SPOTTER & SCRAPER, Anderson Power Unit, Late.
SPRU CUTTER, Milwaukee 56 tons, 2½ cap., M.D.
SURFACE PLATES & TABLES, all sizes.
TAPPER, #1 Cam Haskins, Motor Driven, Late.
TAPPER, #1 Bakewell (Warner & Swasey) Late.
TRUCK, 2000 lbs. Hyster Fork Lift 9' Model QT-20.
TRUCK, 4000 lbs. LT-44 Towmotor Fork, Lift 9'.
BRINELL TESTER MACHINE, Type UK300M.
BRINELL TESTER, Type 03DR, Stool City.
WELDER, 500 amp. Westinghouse Flexers A.C.
WELDER, 200 & 400 amps. Gen. Elec. Portable Arc.
WELDER, 75 KVA Federal M.D., Spot.
WELDER, 200 KVA Federal, Projection.
WIRE STITCHER, Morrison & Acme, M.D.

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PARTIAL LIST OF LATHES

American 30"x12', 3 SCD, 6' centers.
American 30"x14' G.H., 12 spindle speeds.
American 16"x8' bed, 3 SCD, bowl head.
American 14"x6', 3 SCD bowl head.
American 30"x10' bed Geared Head, 12 spindle speeds, 2-9/16" hole in spindle, vee belt drive.
Boye & Emmes 20"x10', G.H., complete with taper attachment.
Greaves Klusman 22"x8' G.H. Lathe, complete with taper attachment.
Hendey 20"x10' bed Geared Head, 8 spindle speeds, 1¼" hole in spindle.
LeBlond 17"x8' bed 3 SCD.
LeBlond 27"x10', 3 SCD Lathe, 3'11" centers.
LeBlond 25/50 x 6/10 Sliding Bed Gap Lathe, G.H., Timken bearing.
Lodge & Shipley 14"x5' G.H., single pulley drive, 12 spindle speeds, 20" centers.
Lodge & Shipley 16"x120" centers G.H., Timken bearing, drop lever handles in apron, late type.
Lodge & Shipley 16"x6', single pulley.
Lodge & Shipley 30" x 12' bed G.H., 12 spindle speeds, 62" centers.

TURRET LATHES

Acme #2 Full Universal, single pulley drive, hole thru spindle 3½".
Acme 5R Universal Ram Type Turret Lathe, bar feed, late type.
Gisholt 1-L Saddle Type Turret Lathe, with bar feed, late type.
Oster 601 Rapiduction.
Potter & Johnston 6D Automatic.

BORING MILLS—Vertical

Betts 100", two heads on rail.
Bullard 42", AC motor drive.
Niles 36"-44", 1 rail and 1 side head.
Niles 42"x50" Driving Box Borer, Burnisher and Facer, motor driven, late type.
42-50 Niles Vertical Boring Mill, one rail and one side head, late.

GEAR MACHINERY

Fellows 6I2 Spur Gear Shaper.
Fellows 725 Gear Shaper, with spur guide.
Gould & Eberhardt 18-H Hobber.
Gould & Eberhardt 96H Gear Hobber.
Gould & Eberhardt 60BM Gear Rougher.

GRINDERS—Cutter & Tool

Oliver Template Tool Bit Grinder, late.
Sellers 4T Tool Grinder, late type.
Sellers 6T Tool Grinder, late type.

GRINDERS—Internal

Heald 78 Centerless, Internal & Cylindrical, late type.
Heald #50, tight & loose pulley.
Heald #70A, new 1941.
Heald 72A3 Plain Internal Grinder, late type.

GRINDERS—Cylindrical

Landis 26"x168" centers Plain, arranged for motor drive with motors, 10 speeds 3 to 62.
Landis #2 Universal, 12"x35" centers, belt drive.
Norton 12"x48 Universal Hydraulic, late type.

GRINDERS—Thread

Jones & Lamson 8x31, late type.

MILLERS—Auto. or Prod.

Hall Style "D" Planetary Mill, late type.
U. S. Multi-Miller, Model 1-5-2, late type.

MILLERS—Plain

Brown & Sharpe #3, 4 SCD.
Cincinnati #4, single pulley drive.
Douglas #0, rectangular overarm.
Milwaukee 2 HL Plain Mill, late type.

MILLERS—Vertical

Brown & Sharpe #3, single pulley drive.

MILLERS—Universal

Brown & Sharpe 3A, motor in base.

DRILLS—Radial

American 5'14" column, Triple Purpose.
Fosdick 6'15", Heavy Duty Radial Drill.

PLANERS

Pond 48x48x16' Double Housing, DC drive, 4 heads.

ROLLS

Niles 12'x¾" Initial Type Bending Roll, motor driven with 40 HP motor.

SHAPERS

Averbeck 21" B.G., 4 SCD.
Columbia 28" B.G., gear box drive.
Gould & Eberhardt 20", B.G., gear box.
Gould & Eberhardt 24" B.G., gear box.
Gould & Eberhardt 28" B.G., gear box.
Gould & Eberhardt 32" B.G., gear box.
Potter & Johnston 24" Universal.
Smith & Mills 25" B.G., 4 SCD.

BOREMATIC

Heald #42, late type.

MISCELLANEOUS MACHINERY

H&G Model I-K Threading Machine, late.
Hobart 200 Amp Arc Welder, late type.
Hoffman Heavy Duty Portable Cleaner.
Speedare 150 Amp Welder, late type.
Taft Pierce Bench Center, 8"x48" centers.

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Brown & Sharpe No. 0, 0G, 00G and 2G—Misc. equipment—MD
Conomatic 1⅜" 8-spindle—Chip conveyor—Stock stands—Tooling—MD—Late type
Conomatic 4¾" 4-spindle — Stock stands — Large ass't tooling—MD—Late type

FORGING EQUIPMENT

Ajax 1½" Upsetter—Stroke of header 8¼"—Die size 5" x 9½" x 12"—MD
Billings & Spencer 600 lbs. and 800 lbs. Board Drop Hammers
United Engineering 3000 lbs. Board Drop Hammer

MILLING MACHINES

Cincinnati 72"x54"x206" Hypro Planer Mill—Infinitely variable speeds—4 heads—MD
Brown & Sharpe No. 2 Light Type—Range 28"x 10"x15"—Coolant Flange type—MD—Late type
Milwaukee 3H Universal—Range 34"x12"x17" —Table 64"—13½"—Dividing head—MD—Late type
Cincinnati No. 4 Vertical High Power—Range 42"x18"x16"—Power rapid traverse—Coolant—MD
Brown & Sharpe No. 3A—Range 34"x12"x19" — Double Overarm — Dividing head — Rapid traverse — MD

MISCELLANEOUS

Bertsch 1¾" x 18' PYRAMID type Bending Roll—Top roll 25" dia. Bottom rolls 19" dia. —MD—Late type

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BLISS No. 88 Straight Side Single Crank Press, Bed Area 30" x 29", 18" Stroke of Slide, Marquette Air Cushion, 255 ton Capacity.
TOLEDO Double Cranks, Nos. 91-42, 92C, 93½C, 93½E.
CLEVELAND Double Cranks 65-G-72, 45-D-60.
NIAGARA Double Cranks, 67C, 68C, 612C.
BLISS No. 25K Knuckle Joint 600 Ton Capacity.

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Model B3B Natco 24 spindle Multiple Drill, adjustable arms, #2 taper, 1944.
#72-A Heald Tool Room Plain Internal Grinder, T-base, cross-sliding head, 30" swing.
Natco 3-way Horizontal Drill, with hydraulic cycle

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No. 55 Bliss Consolidated S.S.S.C., equipped with side shear, 4" str., M.D.

50-ton Henry & Wright, equipped with double roll feeds and scrap cutter, 2" str., M.D.

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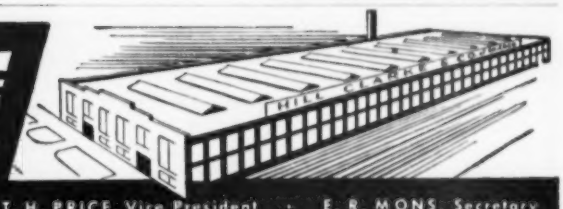

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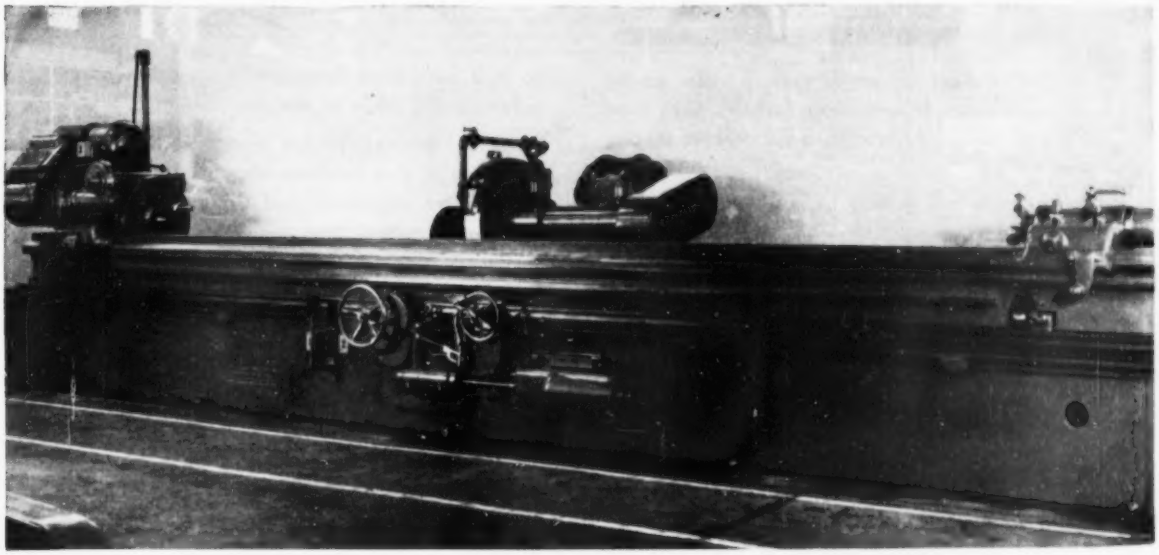

NORTON CYLINDRICAL GRINDER 24" Swing x 264" (22 feet) between centers

AUTOMATICS

1-1/16" Model A Cleveland (1942)

DRILLS

1 Spdl—14" Sw—No. 2 Avey Cam Fd.
1 Spdl.—26" Sw.—No. 2 LMS Leland-Gifford
1 Spdl.—30" Sw.—No. 4 taper Aurora
2 Spdl—24/ Sw—No. 3 Avey
12 Spdl. D-31 Fox, No. 2 Taper

GEAR MACHINES

No. 12HS Gould & Eberhardt Hobber
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper
No. 36-BM G & E 3 Spdl. Rougher
No. 612-A Fellows Gear Shaper
No. 615-A Fellows Gear Shaper
No. 65 Fellows—Cone Dr.
8" cap Red Ring Gear Lapper

GRINDERS

6" x 18" Landis (1942)
6" x 18" Norton Cylindrical (1943)
10" x 36" Norton Type C
10" x 48" Norton type C (1943)
Hill-Clarke Cylindrical Grinders
10"x36" centers
10"x72" centers
18"x96" centers
24x32 Gap x 144" centers
14"x36" centers 14"x72" centers
14"x96" centers 18"x96" centers
20"x96" centers
24"x264" centers
No. A-3—12" Arter Rotary Surf.
No. 1109 Bryant Internal Grd. (1951)
(9" swing—1" bore x 8½" grind stroke)
No. 5 Bryant Internal Grd.
No. 5B Bryant Internal Grd.
No. 16-16 Bryant Internal Grd.
No. 16-A-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 16 A-28 Bryant Internal Grd.

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No. 24-26 Bryant Internal Grd.
No. 24-36 Bryant Internal Grd.
No. 81 Heald Centerless Internal
No. 74 Heald Internal Centerless

HORIZONTAL BORING MACHINES

No. 45—4½" Giddings & Lewis

LATHES

16"x33" R-14 Seneca Falls Auto. Lathe
18"x6' American Geared Head Lathe
19"x8' LeBlond Hvy. Duty Lathe
27"x12' American Geared Hd. Lathe
27"x12' centers LeBlond Lathe
36"x18' Putnam Grd. Hd. M.D.
5W Acme Ram type Tur., 2" Capacity
No. 6 Warner & Swasey Tur.-Bar Fd.
18" Libby Tur. Lathe, M.D.
No. 3AL Gisholt Cross-Slide Tur.
No. 4A Warner & Swasey—7⅞" Hole—Spdl.

MILLING MACHINES

No. 08 Cincinnati Vert. Mill (1942)
54"x30"x16' Ingersoll Slab Mill
6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney (1942)
10"x60" Pratt & Whitney Thrd. Mill
12"x102" Lees-Bradner Thrd. Mill

PLANERS

36"x36"x12' Cincinati, 2 hds.
48"x36"x14' Gray, 2 hds.
48"x48"x12' Cincinnati, 2 hds.
60"x48"x27' American, 4 hds.

MISCELLANEOUS

1"-2" Dia. Cap. Micro. Hor. Hone—#200
¼"-1" Dia. Cap. Micro. Hor. Hone—#H-2
42"—18 gage Economy Power Shear
75 Ton R & K Straight Side Press
3 Ton Fox Hydraulic Press
2—12"x96" Magnetic Chucks
20'x1" cap Southwark Roll
18" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
No. 0 Bakewell Tapper

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★ GRINDERS

NORTON Cylindrical Grinder 23"x72", M.D., 1942

★ MILLERS

CINCINNATI No. 2MH, Universal, 1942

CINCINNATI, No. 4, Vertical Mill—1940

KEMPSMITH No. 2G, Universal, 1953

INGERSOLL Planer Type Mill, 24"x24"x 12" 2 Swivel Heads, Adj. Rail, M.D.

INGERSOLL Planer Type Mill, 24"x24"x 96", 3 Heads, Adj. Rail, M.D.

INGERSOLL Openside Planer Type Mill, 42"x42"x16', M.D.

★ LATHES

AMERICAN Engine Lathe 30"x124" Centers, Geared Head, M.D.

AMERICAN Engine Lathe 30"x156" Centers, Geared Head, M.D.

★ PLANER

GORTON 36"x30"x8', Box Table, Belt driven

★ RADIAL DRILLS

AMERICAN Triple Purpose Radial Drill, 6'-17", Electric Clamping, M.D.

AMERICAN Triple Purpose Radial Drill, 5'-15", Electric Clamping, M.D.

WESTERN Radial Drill, 7', M.D., 1942

WESTERN Radial Drill, 4', M.D.

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to fit Warner-Swasey & Gisholt Machines

M-1840	Slide Tool for #4A Machine
M-1375	Single Cutter Turner for #5
M-1374	Single Cutter Turner for #4
M-1913	Reversible Cutter Holder for 1A
M-1853	Multiple Cutter Turner for #3 & #4
M-1854	Multiple Cutter Turner for #4
M-1887	Flange Tool for #3 & #4
M-801	Floating Holder for #1
M-802	Floating Holder for #2
M-1720	Adjustable Holder for #1
M-1721	Adjustable Holder for #2
M-627	Drill Holder for #1
M-658	Drill Holder for #2
M-1861	Knee Tool for #2

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3/16" MANVILLE #0 D.S.S.D. Header
#2A WARNER & SWASEY Turret Lathe
#0 W.F.F. Screw Slotters
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CAM MILLERS

VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

CENTERING MACHINES

SUNDSTRAND: 44" Double End Centering Machine

CUTTER & TOOL GRINDERS

FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New) automatic indexing

DRILLING MACHINES

ALLEN: #2 High Speed, 15" overhang
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
SUNDSTRAND: 44" Double End Centering Machine

GEAR CUTTING MACHINES

BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 1¾ D. P. capacity
CLEVELAND: Model 130 Gear Hobber (like new)
CLEVELAND: Model 140 Gear Hobber (like new)
FELLOWS: 61A Shaper, 18" dia.
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: 72 Shaper, 7" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Gear
SYKES: Gear Shaper 14" external, 20" internal (New)
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)

GEAR AND SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x 24" Hydr. Spur Gears and Splines

GEAR FINISHERS & TESTERS

FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 capacity 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain

3-WAY GUARANTEE

1. **Should any machinery purchased from us prove unsatisfactory, you can return the machines within 30 days, via freight prepaid to our plant, and a full refund will be made.**
2. **Machines at our plant can be demonstrated and tested under power before purchasing.**
3. **You are dealing with a well-established, highly-rated firm of machinery engineers with over 33 years of proven responsibility.**

LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE

GEAR GRIND MACH.: GG-19, 10"x 24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed

GRINDERS—INTERNAL

BRYANT, 16-16 Internal Hydraulic
BRYANT: No. 5Y Internal
HEALD: 72A3 Sizematic Centerless

GRINDERS—RADIUS

VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #639, capacity 7"
VAN NORMAN: #649, capacity 6" to 16" diameter
VAN NORMAN: #3½ Un. Radius

GRINDERS—THREAD

EXCELLO: #31 External, dia. 5"x18"
JONES & LAMSON: #636 Universal, 6" dia. x 36" centers and one extra multiform wheel dressing attachment

HONING MACHINES

MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia.

LAPPING MACHINES

FELLOWS: 8LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES PRODUCTION

BLOUNT: Polishing speed lathe 12" dia. x 48" centers
H.E.B.: High production hydraulic duplicating and copying lathes (new)
LODGE & SHIPLEY: #3A Duomatic. 25½" swing x 27" centers
POTTER & JOHNSTON: #6 DREL Automatic
New Engine Lathe 27" swing x 23' centers

LATHES—TURRET

WARNER & SWASEY: 1A, 2A, 3A & 4A
WARNER & SWASEY #3, #4 & #5 Turret Lathes
HERBERT: #2, #4, #7, and #8 Sizes (new)
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES

CINCINNATI Hydromatic Duplex, Rise-and-Fall, 34-36, Tracer Control
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

SAWS & CUT-OFF MACHINES

CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: CT-36 Thread Miller chucking type, 13½" hole.
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity, single spindle
NATCO: Vertical Tapper 16 spindle

WIRE FORMING MACHINES

BAIRD: 4-slide wire former
HEENAN & FROUDE: Wire forming, 4-slide machines (new)

MISCELLANEOUS

OPTICAL PROFILE GRINDER, Wickman, New
AUTOMATIC SCREW MACHINE, Wickman, Single Spindle, 7/16", New
CENTERING MACHINE: Sundstrand, 44" Double End.
CUTOFF: Campbell, abrasive 425 Cutalator 4½" dia. Capacity
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
LATHES: Blount Polishing Speed Lathe, 12" dia. x 48" centers
HARDNESS TESTER: Gogan Brinell, Model 16-8
SHEFFIELD Precisionaire Gauge
WIRE FORMING MACHINES: 4-slides (new)

INSPECTION INVITED — Telephone HAnover 2-4520

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MACHINE TOOL ENGINEERS SINCE 1919

RELIABILITY has been earned by WIGGLESWORTH MACHINE TOOLS

AUTOMATICS
2⅝" Cone 4 spdle., well equipped, 1936.
#24 New Britain 4 spdle. chucker, 2½" cap.
¾" Model F Gridley, 4 spdle.

2" 4 SPINDLE CONEMATIC, THREADING SPDLE., TAPPING ATTACHMENT, BAR FEED, CONSIDERABLE TOOLING. EXCELLENT CONDITION. 1943

BORING MILL
36" Bullard New Era, rail & side head
42" Bullard New Era, rail & side head

GRINDERS
10" x 36" Norton type C, hyd. infeed, late
#76RA Rogers knife grinder, 76", late
Cinn. Internal, 24" swing, 78" stroke
#44 Heald rotary surface, 22" dia.
14" Hammond WD carbide tool, late
#104 Rivett Universal, 1942, rebuilt
#4 Bryant internal, auto. sizing
#33 Excello ext. groove, late type
#86—30" Gardner vert. disc grinder
14x36" Norton C semi-auto., cyl.
73 Heald Internal Centerless
73 Heald Internal, 1944, like new
P & W deep hole drill grinder, late
Model 1311 P & W contour, late

DRILLS
D-4 Colburn, #5 M.T., 3½" cap., 24" swing
5'13" Cinn. Bickford, mtr. on base
28" Cinn. sliding head, round col., older
Baker Hvy Dty, #5 M.T., p.f.
#2LM5 Leland-Gifford, 26", hydraulic
#2 Allen, 2, 4, 6 spdle., #2 M.T.
Type 14 Natco 12 spindle
Model 4230 Bodine Drill & Tapper, 12 sta.
Moline Hole Hog, 2 spindle

GEAR MACHINERY
6" Gleason straight bevel generator
13LS Fellows lapper, late
7A Fellows, shaper high speed, hvy dty
61A Fellows, shaper, high speed precision

LATHES
15 x 60" Cinn. Tray Top, toolroom, 1951
42"x26' ctrs American, High Duty, 16 speeds
30"x10' American geared head, taper att.
48"x35' LeBlond Hvy Dty, taper, late
Gisholt Simplimatic, platen type, late

TURRET LATHES
#3 J & L Univ. bar feed, 2" hole, late
#5 B & O Univ., chuck, pre-selector, late
#1A W & S Univ., 3" hole. #417,756
#1L Gisholt Universal, 3" hole, 1937
Libby type H, 24" swing, 8 spdle, speeds
#2 Simmons Microspeed, air chuck, late
#3 Gisholt Universal, late
#4 W & S, bar feed, serial #342461

SHAPERS & PLANERS
30"x30"x17' Cleve. Openside
48x48x14' Detrick & Harvey dble. hsg.
26" Smith & Mills shaper, 4 step cone

MILLS
#2 B & S Vert., 7½ 4p, late
08 Cinn. horiz., rise & fall, 1943
08 Cinn. horiz., auto. cycle, 1943
#1½B K & T horiz., dble. overarm, rebuilt
10C Van Norman Contour
#3 Cinn. high speed dial type, vertical
#3 Cinn. high speed dial type, horizontal

THREADERS
8x16" Hanson-Whitney Universal, mill, late
6x80" P & W miller, splining & milling
#50 Excello Precision grinder, 28x68"
13" Automatic Machinery miller, late
LT636 Lees Bradner mill, 18 x 36", late
1½" Landis, 2 spdle., lead screw type
#31 Excello, diamond dresser, late

FURNACES
Whiting Converter, 2 ton cap., late
Model 5P Juthe, gas, 1000° F
Lithdraw heat treat, 1200° F, late

PRESSES
#37 Excelsior dble. crank, 45 ton
250 ton Elmes hyd. shell nosing, 21½" str.
Ferracute type EG-52 embossing, 150 ton
#4 Toledo OBI, 25 ton. 2" stroke

MISCELLANEOUS
MAGNAFLUX: MA-3 production type, 3000 amp.
WELDER: Sciaky 40 KW press type spot
TAPPERS: Haskins 2CAM, 5/16" late
Cleve. Model EO, ½", late
KEYSEATER: #6-38 Mitts & Merrill, 4 x 36"
HAMMER: 300# Bradley Upright Helve
WELDERS: Hobart and P & H Arc, 400 amp.
BULLDOZERS: #2 Ajax High Speed, 30 ton
SAW: 34" Espen-Lucas, 1945

T. R. WIGGLESWORTH MACHINERY COMPANY
1719 SUPERIOR AVENUE • • • SUPERIOR 1-8727 • • • CLEVELAND 14, OHIO

EMERMAN *Offers From* STOCK

Late Type Machines in Guaranteed Operating Condition **FOR SALE OR RENT**

ENGINE LATHES
20"x96" Sidney—1932
20"x72" Reed Prentice—1925
54"x18' Houston, Stanwood & Gamble—1920

TURRET LATHES
1—#3 Gisholts, Bar and Chuck—1943
#7 Bardons & Oliver, Bar & Chuck—1940
3—#1L Gisholts, Bar & Chuck—1932-42
#1A Warner & Swasey, Bar & Chuck—1942
#3L Gisholt, Chuck—1942
#4A Warner & Swasey, Chuck—1942
#5 Warner & Swasey—1943
#5 Gisholt Bar Chuck and Threading—1943

PRODUCTION LATHES
2—15"x30" Lips Carbo-Matic—1942
20"x25" Fay—1948
#16AL LeBlonde—1940
8"x108" Lo Swing—1947

HORIZONTAL BORING MILLS—TABLE TYPE
#330-T Giddings & Lewis—1940

VERTICAL BORING MILLS
24" Bullard—1926
42" Bullard—1928
42" King—2 heads le rail, Side Head—1932
42" Bullard Cutmaster—1947
54" Bullard—1930
64" Bullard—1933

MILLING MACHINES, HORIZONTAL VERTICAL AND PLAIN
#3H K & T Plain Horiz.—1943
#3K K & T Plain Horiz.—1943
#3V Van Norman Vert.—1942
#3H K & T Vert.—1942
1854 K & T Simplex Prod. Mill—1943
1402 K & T Simplex Prod. Mill—1932
1248 Kearney Trecker Simplex Production Mill—1943
448 Cincinnati Hydr. Production—1941

GRINDERS
#35 Ex-Cello Precision Thread Grinder—1942
84" Lumsden Vert. Rotary Surface Grinder—1940
72A3 Heald Sizematic Internal Grinder—1943
72A3 Heald Extended bed, Internal Grinder—1943
72A Heald Internal Grinder—1943
3B Abrasive Auto. Surface Gr.
6x18 Norton Hydr. Cyl.—1940
10x36 Norton Hydr. Cyl.—1942
10x48 Norton Heavy Duty Plunge Cut.—1941

LATE TYPE MISCELLANEOUS
12" 6-Spindle Bullard Type D. Multimatic—1943
Hammond Radial Drill & Tapper—1942
24" Cleereman Heavy Duty Drill—1942
Type A Barber-Coleman—1942-47
Type A Barber-Coleman 84" Extended Bed—1937
7125A Fellows Gear Shaper—1943
61 Fellows Gear Shaper—1943
61A Fellows Gear Shaper—1943
#655 Toledo Knuckle Joint Press—1934

EMERMAN MACHINERY CORP.
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McDONALD
USED MACHINERY

Landis 20"x72" and 18"x96" Plain Ext. Grinders.
Hanchett 25 H.P. Sp. Vert. Hydr. Surf. Grinder 12"x48" table.
W & S No. 2-A Grd. Hd. Univ. Turret Lathe shucking.
Rivett No. 104 A.C. M.D. Internal Grinder.
Milwaukee Nos. 2-B & 3-B Horiz. Plain Millers D.O.
Cincinnati 36"x36"x10' D.H. Planer 2 Hds. Box Table.
Heald No. 72A-3 Hydr. Int. Grinder Red Head Sp.
LeBlond 27"x12' Bed Grd. Hd. G.C.G. Lathe 13" hollow spindle.
Norton 6x18" Horiz. Hand Surf. Grinder 1941.
Cincinnati No. 2 Hi-Power S.P.D. Vert. Miller.
G & L 3" Bar Horiz. Boring Mill.
20" All Grd. Camel Back Drill 1-Sp. and Barnes.
Amer. 3' & Morris 3½' Arm Radial Drills.
Blanchard M.D. Vert. Sp. Surf Grinder 26" chuck.
Campbell No. 213 abrasive cut off 1947.
Sundstrand 4-Sp. Vert. Rigidmill.
Heald #22 Rot. Surf. Grinder 12" chuck 1947.
Nazel #3-B Vert. Air Hammer A.C. M.D.
Landis 2-Sp. 2" Cap. Belt Threader M.D.
Hendey 16"x8' Bed G.C.G. Lathe 1938.
W & S No. 4 Ram Type Grd. Hd. Turret Lathe.
G & E 24" Gear Box Shaper Tilt. Table Top.
Newton 48" Table 1-Sp. Cont. Vert. Miller.
Foster 2-F Fastermatic Hyd. Turret Lathe.
Kempsmith No. 2 Vertical Maximiller M.D.
Heald #70-A Red Head Sp. Internal Grinder.
Springfield Planer Type Surf. Grinder.
P & J #2 Auto. Prod. Miller, 2 Tables.
Foote-Burt #23 Box. Cst. 1-Sp. Hvy. Drill.
L & N, 8', 10' & 12' Press Brakes.
Bullard 24" & 30" Vert. Turret Lathes.
Lynd-Farquhar 26" stroke openside Shaper Planer.

MONA

McDONALD MACHINERY CO.
1531-35 No. B'way., St. Louis 6, Mo.

NILES TIME-SAVER LATHE
Late Type
27" x 16' between centers
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22" x 84" Pratt & Whitney No. 38 Vertical with 30 H.P. AC Motor, New in 1923.
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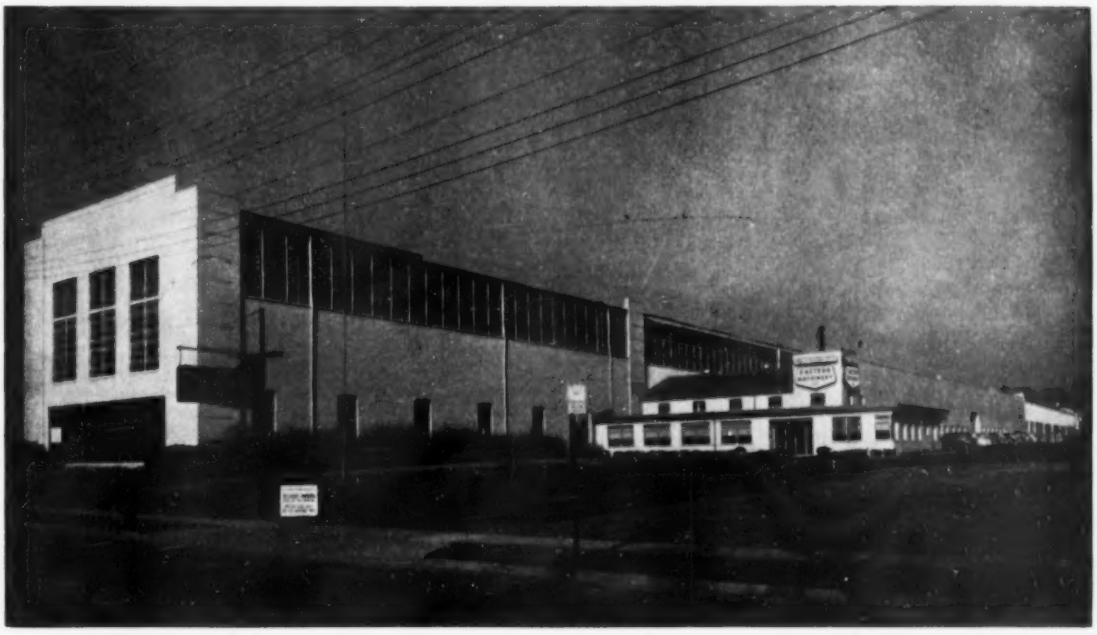

HAND MILLING MACHINE

No. 3 Garvin, m.d.

UNIVERSAL MILLING MACHINES

No. 2½ LeBlond Heavy Duty, cone, motorized
No. 3A Brown & Sharpe Standard, m.d., later type
No. 3B Milwaukee, belt

PLAIN MILLING MACHINES

No. 1B Milwaukee, m.d.
No. 2 Rockford, m.d.
No. 4 Ohio, cone
No. 4 Cincinnati Plain High Speed Dial Type, m.d., late
No. 4 Cincinnati Plain Medium Speed Dial Type, m.d., late

MANUFACTURING TYPE MILLING MACHINES

3A Sundstrand Copy Rigidmill, m.d.
No. MM-1-6 U.S. Multi-Miller, m.d.
Rowbottom Cam Milling Machine, vee belt m.d.
Model 1403 Milwaukee Simplex Production Milling Machine, m.d.
Type P Ohio, m.d.
4" Pratt & Whitney Spline, m.d.
No. 33 Kempsmith, s.p.d.
18", 24" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, m.d.
No. 2I Brown & Sharpe Automatic, s.p.d.
30"x24"x12" Ingersoll Planer Type Milling Machine, m.d.
48"x16" Newton Slab Miller, m.d.
48"x48"x20" Ingersoll Fixed Rail Milling Machine, for tank work
54"x30"x16" Ingersoll Slab Miller, m.d.
Taylor & Fenn 2 spindle Spline Miller, m.d.

THREAD MILLING MACHINES

14"x16" U6 Automatic Hob, m.d.
Hall Planetary, m.d.
6x14", 6x20", 6x48", 5x80" Pratt & Whitney
10x24" Hanson-Whitney, m.d., latest

VERTICAL MILLING MACHINES

Sundstrand Rigidmill, m.d., vertical spindle
No. 66 Cincinnati, m.d., latest
No. 3 Standard Plain Milwaukee
Newton Vertical Miller, rotary table
54" Ingersoll Single Spindle Adjustable Rotary Mill, m.d.

MILLING MACHINE ATTACHMENTS

36" Cincinnati Power Feed Rotary Table, m.d.
16" Cincinnati Circular Milling Table, p.f.
Kearney & Trecker Attach. for Milling Bridge Reamers, 62" Long & 24" wide
1½" Cincinnati Rack Milling Attach. for No. 3 Dial Type Miller
Vertical Attachment for Milwaukee Mfg. Type Miller
16" Kearney & Trecker Rotary Table, p.f.
Rack Cutting Attach. for No. 4 Cincinnati H.P. Rect. Overarm Miller
Rack Mill Attach. for use on No. 5 Cinti. H.P. Rect. Overarm Miller

PIPE MACHINE

2" Forbes Type Curtis & Curtis Pipe Machine, m.d.

PRESSES

300 ton Niles-Bement-Pond Wheel Press, m.d.
600 ton Niles-Bement-Pond Wheel Press, m.d.
Chambersburg 30-ton Hydro-Pneumatic
Fast Feed OBI Punch Press, 2190 Bl. 10 ton, 2" stroke
No. 1 Robinson OBI flywheel vee belt, m.d.
No. 5I Famco Punch Press, floor model, vee belt m.d., 1" stroke
100 ton Chambersburg Hydraulic
No. A-2 Niagara OBI Punch Press, flywheel vee belt m.d., 2½" stroke
No. 2 Robinson OBI Punch Press, flywheel type
No. 13 Toledo Horning Press, m.d.
No. 12 Toledo Punch Press

PUNCHES & SHEARS

No. 2 Hilles & Jones Horizontal Punch, m.d.
No. 6 Long & Allstatter Single End, m.d.
No. 7 Thomas Vertical, latest
No. 6½ Hilles & Jones Punch & Shear, single end, type G
Cleveland Shear, 72" gap, 18" blade, will shear 1910 —1" plate
72" gap Cleveland Plate Punch

PLANERS

P10 Coulter Crank Type Shaper-Planer, 1 head, m.d.
20"x20"x5' Whitcomb-Blaisdell Planer, 1 head, m.d.
24"x24"x5' G. A. Gray Planer, belted m.d., 1 head on cross rail
24"x24"x6' G. A. Gray Planer, belted m.d., 1 head on cross rail
30"x30"x8' Cincinnati Double Housing, 2 rail heads
30"x30"x10' Cincinnati, belted m.d., 2 heads
36"x36"x10' Betts, belted m.d., 2 heads on rail, 2 side heads
36"x36"x10' Niles, variable speed m.d., 2 heads on rail, later type
36"x36"x10' Niles - Bement - Pond, belted m.d., 1 head on cross rail
36"x 6"x18' Niles-Bement-Pond, 2 heads, variable speed m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
36"x36"x24' Cincinnati, belted m.d., 2 heads
42"x42"x14' Niles-Bement-Pond, reversing m.d., 2 rail heads
42"x42"x26' G. A. Gray, 2 heads, belted m.d.
48"x48"x18' Niles-Bement-Pond, 2 heads, belt
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
48"x48"x28' Cincinnati, reversing m.d., 4 heads
48"x48"x30' Cincinnati, 4 heads, belted m.d.

IN ADDITION TO THE ABOVE, WE ALSO HAVE IN STOCK AUTOMATICS, BOLT THREADERS, HORIZONTAL AND VERTICAL BORING MILLS, BROACHES, RADIAL DRILLS, BALL BEARING DRILLS, HORIZONTAL DRILLS, MULTIPLE SPINDLE DRILLS, UPRIGHT DRILLS, GEAR MACHINERY, GRINDERS, HAMMERS, HONING MACHINES, MFG. LATHES, ENGINE LATHES, MILLING MACHINES, TURRET LATHES, ETC.

WRITE FOR COMPLETE STOCK LIST

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS
EMCO

LATE MODEL MACHINE TOOLS . .

AUTOMATICS
No. 656 New Britain Chucker, 1943.
1½" 6 Spdl. Cone Automatic, 1941.
2" Model A Cleveland, 1941.
1-1/16" Model A Cleveland, 1943.
No. 00G Brown & Sharpe, 1941.

BROACHES
HP-100 La Pointe Horiz. Broach, 1945.

DRILLS
3'-11" Archdale Radial, 1947.
Ma-6 Avey 4 Spindle, H.F. 1943.
Allen Single Spindle Drill & Tapper, 1942.
No. 2 LMS Leland-Gifford H.F. 1942.

GEAR EQUIPMENT
No. 7 Gleason "Revex" Rougher, 1943.
No. 0 Gleason Revacycle Generator, 1940.
No. 72 Fellows H.S. Gear Shaper, 1942.
10" Pratt & Whitney Hyd. Gear Grinder, '42.

GRINDERS, CYLINDRICAL
10"x18" Norton Plain Type "C", 1940.
6"x30" No. 12 B & S Hydraulic, 1940.
No. 2 Cincinnati Centerless Grinder, 1944.

GRINDERS, INTERNAL
No. 72-A3 Heald Plain Hydraulic, 1942
No. 24-36 Bryant Hydraulic, 1943.
No. 16A2B Bryant Hole & Face, 1942.
No. 16 CP 16 Bryant Hydraulic, 1942.
No. 16-16 Bryant Hydraulic, 1942.
No. 172 Heald Hydraulic, Gap, 1940.

GRINDERS MISCELLANEOUS
No. 16A Blanchard Auto. Surface, 1942.
Cincinnati Centerless Lapper, 1942.
SG-11 Geargrind Spline Grinder, 1942.
HRS Barber-Colman, 1942.
#35 Excello Precision Thread, 1942.

GUN BARREL MACHINES
No. ⅛ B x 50 P & W Reamer, Latest.
No. ½ B x 30 P & W Reamer, Latest.
No. ½ B x 50 P & W Rifler, Latest.

LATHES, ENGINE
27"x192" Niles Timesaver, 2 Carr, 1941.
27"x96" Niles Timesaver, 1940.
26"x180" Betts Bridgeford, 1940.
26"x96" Betts Bridgeford, 1940.

LATHES, PRODUCTION
8"x84" Lo-Swing Semi-automatic, 1941.
#8 Sundstrand Stub, 1942

LATHES, TURRET
36" Bullard VTL, Spiral, Late.
No. 2A Warner & Swasey Saddle Type, 1940.
No. 1A Warner & Swasey Saddle Type, 1941.
No. 1L Gisholt Saddle Type, Late.
No. 3R Gisholt Universal Saddle Type, 1943.
No. H5 Libby Universal Saddle Type, 1939.
No. 5 GISHOLT Universal Ram Type, 1942.

MILLS, PRODUCTION
No. 1848 Milwaukee Duplex, 1942.
No. 2-18 Cincinnati Automatic, 1942.
M-18 Milwaukee, 1943.
No. 3 Cincinnati Univ. Dial Type.
No. 68 CINCINNATI Rise and Fall, 1942.

MILLS, TOOL ROOM
#34 Archdale Vertical 1945
No. 3 Van Norman Plain, 1942.
No. 22L Van Norman Plain, 1943.
No. 2 Saimp Vertical New.
No. 2 Saimp Universal, New.
No. 3 Saimp Plain & Vertical, New.
No. 4 Saimp Vertical, New.

SHAPERS
32" Ohio Heavy Duty Univ. 1951.
16" Gernetti Universal Shaper, New.
20" Gernetti Universal Shaper, New.
24" Gernetti Universal Shaper, New.

Partial Listing — Write for latest stock list

INDIANAPOLIS *Machinery & Supply Co.*
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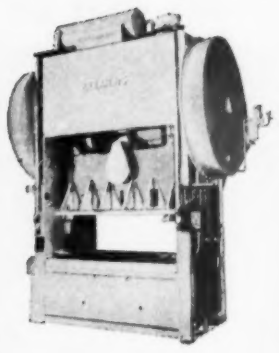

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NEARLY NEW (1948)
GLEASON #7 HYPOID CUTTER SHARPENER. Ser. #24768. Hand Index, Hand Feed. Coolant.
W. C. COWDEN MACHINERY CO.
1207 W. Genesee St., Syracuse 4, N. Y.
Phone 37787

3'11" DRESES Radial Drill—Motor on Arm
30"x16' bed AMERICAN High Duty Geared Head Lathe
42"x15' AMERICAN Heavy Duty Lathe
42"x25' centers AMERICAN Heavy Duty Lathe
No. 172 HEALD Gap Internal Grinding Machine for large swing
6"x18" LANDIS Type C Plain Grinder
10"x72" LANDIS Type C Hyd. Pl. Grinder—1942
Nos. 4D and 6S POTTER & JOHNSTON Automatic Lathes
Nos. 8A & 9A JONES & LAMSON Saddle Type Universal Heavy Duty Turret Lathe
No. 5 CINCINNATI Plain High Power Miller.
No. 0-8 CINCINNATI Plain Milling Machines
No. 2M CINCINNATI Vertical Miller, 1941
No. 1-18 CINCINNATI Plain Mfg. Miller
No. 12 B&S Plain Bed Type Production Miller
6"x60" P & W Model C Thread Miller
No. 64 Fellows Gear Shaper
No. 72 FELLOWS High Speed Gear Shaper
No. 12 FELLOWS Gear Shaver, 1943
No. 36BM GOULD & EBERHARDT Gear Rougher
16/20" GOULD & EBERHARDT Industrial Shaper
100" BETTS Vertical Boring Mill, 2 heads

WIGGLESWORTH INDUSTRIAL CORPORATION
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Kent Owens IV, 1-8, 1-14, 1M
Kempsmith #1 Pl., Vert. & Div. Hd.
Milwaukee 2H Universal
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach, 33
Van Norman #2L Univ., Dividing Head
Van Norman No. 12

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Cincinnati #3, #4 hi-power, 08 Vertical
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Gisholt #5, Bar Feed, Plenty of Tools
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Libby 1 HS with threading att.—3R, 4R
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1, 1A, 2, 2A, 3, 4, 5

MISCELLANEOUS
Band Saw: New Kalamazoo & Johnson
Bolt & Pipe Threader: Landis, Oster-Williams
Broach: New 6 Ton, Horizontal, 11 Ton, Vertical
Hacksaw: Peerless 6"x6", Racine 6"x6"
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Keyseater Davis, Baker
Pipe Bender, Kane & Roach, Vari-drive
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3¼" & 3¾" Cleveland Mod. A
7½" Baird 6 spdl. chucker
14"x33" & 20"x25" Fay
Gisholt Simplimatics
8" 6 spindle Bullard "A" Multaumatic

BROACHES

5 ton, 40" Foote Burt duplex surface
10 ton, 56", No. 3XA Oilgear
12 ton, No. V2 American vertical
15 ton 36" Colonial vertical surface
15 ton, 48", No. H10 48 American
18 ton, 42" No. V12 American

SHAPERS

24" American Auto-Oiled
26" Smith & Mills back geared
26" Morton draw-cut

LATHES, ENGINE

12"x30" Hendey Yoke head
14"x6' Pratt & Whitney
14"x6' Lodge & Shipley
16"x36" Sundstrand Rockford
18"x8' Hendey Yoke head
24"x12'—13' & 14' American

COMPLETE MACHINERY SERVICE

GEAR CUTTERS

Type A & No. 12 Barber Colman
Nos. 1 & 5A Lees Bradner
No. 12H Gould & Eberhardt
16" Cincinnati hobber
24", No. 3 Farwell hobber
No. 130 Cleveland Rigidhobber
72" Schuchardt & Shutte hob
72" Westinghouse hobber
4" Gleason spiral bevel
No. 13 Gleason gear tester
10" Pratt & Whitney gear grinder
8" & 12" Red Ring gear shavers
24"x12" Flather auto. spur
Cimatool tooth rounders

GRINDERS

10"x36" Norton Semi-Auto.
No. 2 Cincinnati centerless
21", No. 6-21-1 Besly opposed disc
22", No. 228 Hanchett opposed disc
23", No. 84 Gardner opposed disc
No. 120 Gardner, 1946
53", No. 24 Gardner Horizontal disc
No. 72 Heald Sizematic & Gagematic
Nos. 5, 16A, 16-28 & 24-36 Bryant
No. 42 Van Norman radius
8"x24", No. 78 Wilmarth & Morman
No. 2 Brown & Sharpe universal

MONEY BACK GUARANTEE

LATHES, TURRET

1" No. 2 Warner & Swasey
1½" No. 3 Bardons & Oliver
1½", No. 601DD Oster
2", No. 5W Acme Universal
2¼" No. W. & S., motor in base
36" Rogers vertical
36" Bullard New Era vertical
No. 4 Warner & Swasey, power feed
3½" x 18" Libby International universal saddle type, power rapid traverse

MILLERS

No. 4-36 Cincinnati Hydromatic
No. 4-48 Cincinnati Hydromatic
No. 2 Cincinnati plain late
No. 36 Van Norman universal

MISCELLANEOUS

AIR COMPRESSOR, 194 CFM Ingersoll
PAPER SHREDDER, M & M "Air Fluff"
OIL EXTRACTOR, No. 501 Barrett
ROD POINTER, Type KK Economy Auto.
BORING MILL, 4" D. & H. floor type
BORING MILL, 72" N.B.P. vertical
COMPARATOR, 20" Portman
HONES, Nos. 172 & 2610 Barnes
KEYSEATERS, Nos. 3 & 4 Mitts & Merrill
PLANER, 30"x30"x10' Cincinnati
PLANER, 36"x36"x10' Niles Bement Pond
SWAGER, No. 4 Torrington

WRITE FOR LATEST CATALOG

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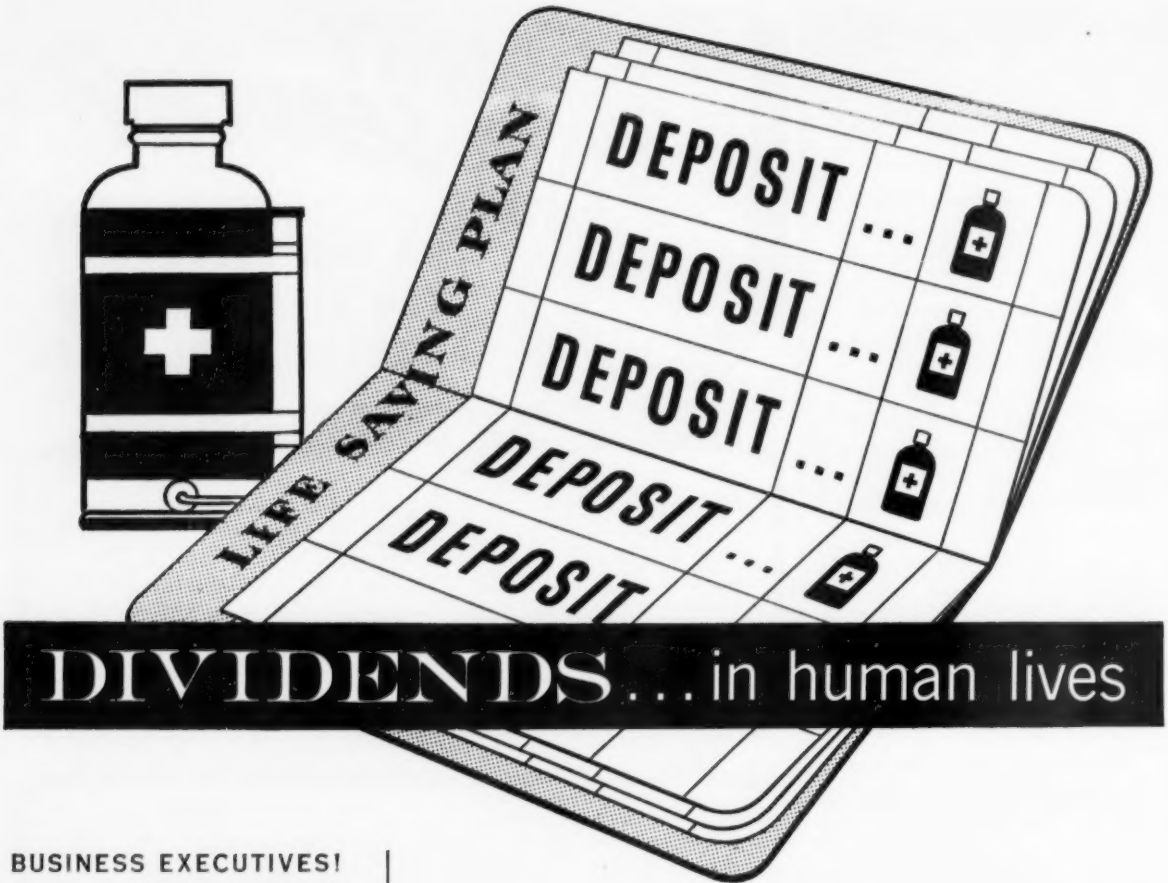
2025 E. GENESEE AVE. • SAGINAW, MICHIGAN
Phone Saginaw 2-3105



DIVIDENDS ... in human lives

BUSINESS EXECUTIVES!

CHECK THESE QUESTIONS

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ○ HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS?
- ○ HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS?
- ○ DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY?
- ○ HAVE YOU ARRANGED TO HAVE A BLOOD-MOBILE MAKE REGULAR VISITS?
- ○ HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM?
- ○ HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION?
- ○ WAS THIS INFORMATION GIVEN THROUGH PLAN BULLETIN OR HOUSE MAGAZINE?
- ○ HAVE YOU CONDUCTED A DONOR PLEDGE CAMPAIGN IN YOUR COMPANY?
- ○ HAVE YOU SET UP A LIST OF VOLUNTEERS SO THAT EFFICIENT PLANS CAN BE MADE FOR SCHEDULING DONORS?

Remember, as long as a **single** pint of blood may mean the difference between life and death for **any** American . . . the need for blood is **urgent!**

NATIONAL BLOOD PROGRAM

America's blood bank needs **more** blood, **now**. Be a regular depositor and know that your dividend is saving a life of some American—somewhere.

It may be a soldier shot down in battle, suffering from **shock**. Or someone here at home, sick and in dire need of new blood to restore life. A mother in childbirth, or a child in an accident.

America must give. America is **you**. Won't you call your Red Cross, Armed Forces or Community Blood Donor Center right now, for an appointment?

GIVE BLOOD

...give it again and again

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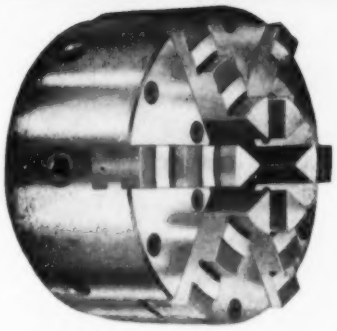
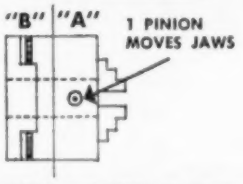
The UNIVERSAL Chuck with .0005 PRECISION!





HOW and WHY it Works

Chuck gripping section "A" is like any scroll chuck with one pinion to move jaws. (accurate to .003"). Section "B" shows how chuck "floats" on adapter (.020" clearance) where 4 opposed screws move chuck on adapter for adjustment to dead true precision. Jaws always come back within .0005" on duplicate work.

Buck AJUST-TRU CHUCKS

6 JAW 6" CHUCK HANDLES WORK OF 93 COLLETS!

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The firm grip of 6 jaws for soft metal or tube work . . .

An end to most needs for stub arbors, mandrels, or special fixtures . . .

A reliable precision chuck adaptable to lathes, screw machines, grinders, dividing heads . . .

The greatest development of recent years to save machinists' time . . .

That's the brief story of this sensational AjustTru chuck. It is unbelievable — but true! Send for catalog with full details.

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2-Jaw Aviation Chuck—6", 7½" (heavy duty)

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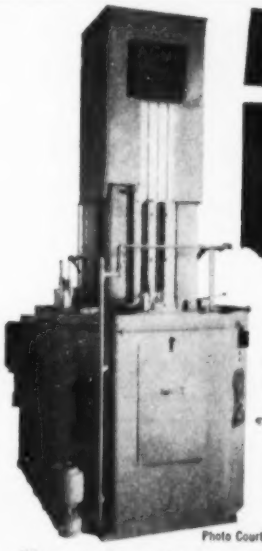

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with a

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This Acme Model U-31 Broaching Machine is equipped with a Ruthman Pump.

Photo Courtesy Acme Broach Corp.

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precision
DRILL GRINDER

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NATICK, MASSACHUSETTS, U.S.A.

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Precision + Speed + Power

. . . THIS VERSATILE MACHINE CAN REPLACE 2 OR MORE SINGLE-PURPOSE MACHINES

KNIGHT'S No. 50
Vertical Milling & Precision Boring Machine

A single solid-base machine with every essential feature for milling and accurate boring—an extremely versatile machine that will do the work of 2 or more single-purpose machines.

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NAME .....

TITLE .....

☐ Send information on Knight's 20" & 42" Rotary Tables.

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THE common belief that "perishable tools" are written off when they go out to the machine is one of today's most expensive notions. Unless control is exercised *in use* as well as in stocking, the machine, method or man that breaks or ruins an excessive number of tools is never spotted. In one test, ratio of tool use on two machines of the same type on the same job was 1 to 7.

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save hours and dollars

driving socket head screws and bolts

APEX DRIVERS

Male hex sizes to fit #5 to 1" socket head cap screws; #10 to 1" socket head set screws. Female square drives: ¼" to 1".

APEX POWER BITS

Male hex sizes to fit #5 to 1" socket head cap screws; #10 to 1" socket head set screws. Hexagon shank sizes: ¼", 5/16", 3/16", 5/8".

APEX INSERT BITS

Male hex sizes to fit #5 to ¾" socket head cap screws; #5 to ½" socket head set screws. Used with Apex bit holders, available for all popular makes of air, electric and spiral drivers.

You can save hours of production time—and dollars in production costs—using Apex tools to drive socket head screws and bolts. Use Apex drivers, power bits or bit holder and insert bit combinations with your power tools to eliminate expensive, time-consuming manual effort. These Apex tools, designed to do a specific job faster and more efficiently, can help increase your productive output.

For complete information, write (on your company letterhead, please) for Catalog 29 (Apex Drivers) or Catalog 21 (Apex Power Bits and Insert Bits).

APEX TOOLS

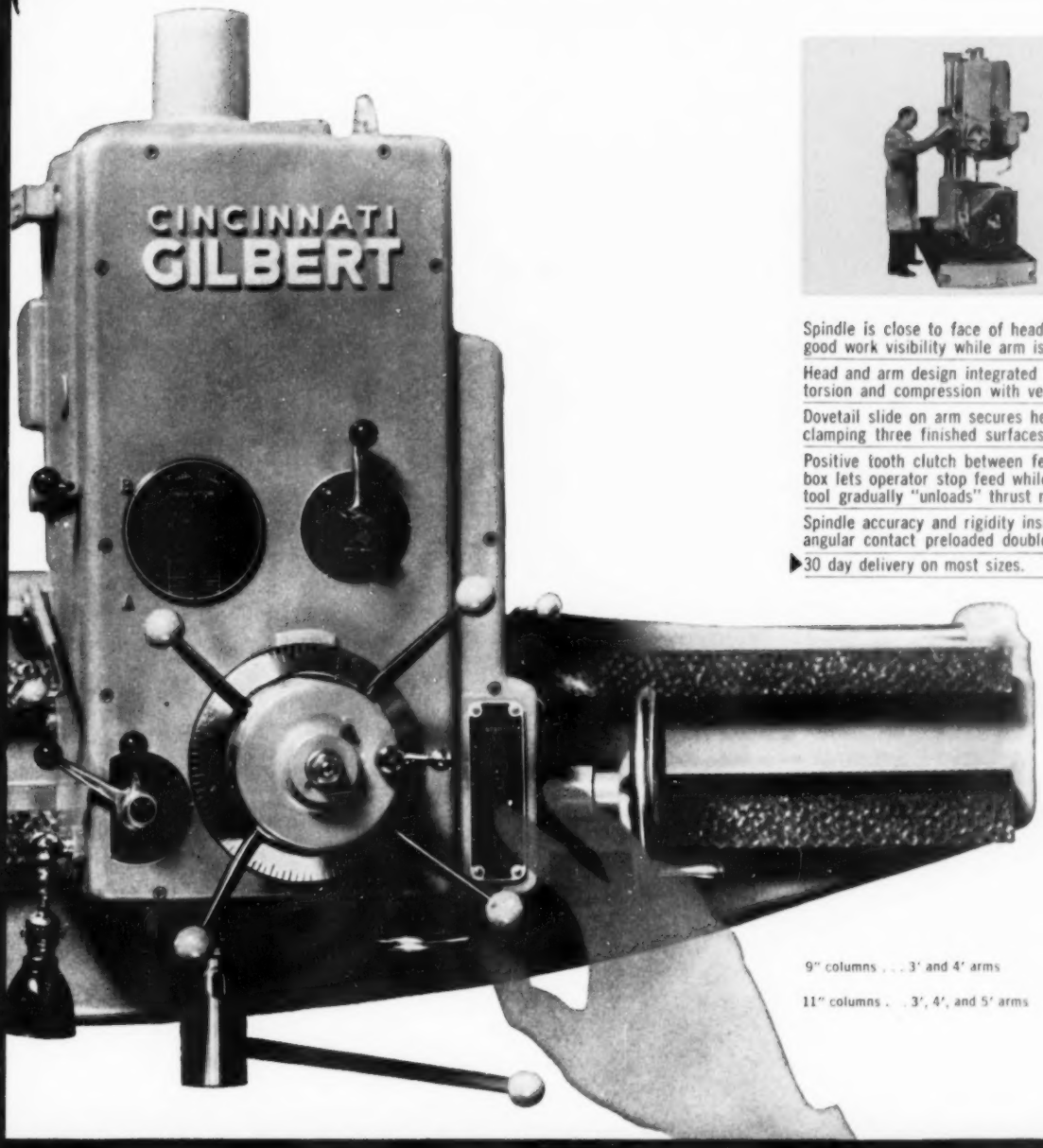
power bits, bit holders and insert bits

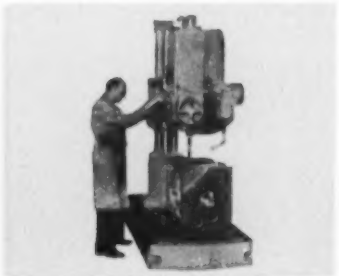
THE APEX MACHINE & TOOL COMPANY

1026 S. Patterson Blvd., Dayton 2, Ohio

POWER BITS, INSERT BITS AND BIT HOLDERS, FOR PHILLIPS, FREARSON (Reed & Prince), SLOTTED, CLUTCH HEAD and SOCKET HEAD SCREWS • HAND DRIVERS FOR PHILLIPS, FREARSON AND CLUTCH HEAD SCREWS • TWO-PIECE DRIVERS FOR HEX HEAD SCREWS • SOCKETS, EXTENSIONS, ADAPTERS AND NUT SETTERS • UNIVERSAL SOCKETS, EXTENSION WRENCHES AND ADAPTERS • AIRCRAFT AND INDUSTRIAL UNIVERSAL JOINTS • SELF-RELEASING AND ADJUSTABLE STUD SETTERS • SAFETY FRICTION TAPPING CHUCKS • VERTICAL FLOAT TAPPING CHUCKS.

MOVES FAST: STAYS PUT





Spindle is close to face of head, provides good work visibility while arm is low.

Head and arm design integrated to withstand torsion and compression with very low deflection.

Dovetail slide on arm secures head by clamping three finished surfaces together.

Positive tooth clutch between feed worm and gear box lets operator stop feed while spindle turns and tool gradually "unloads" thrust normally absorbed by arm.

Spindle accuracy and rigidity insured by four angular contact preloaded double zero ball bearings.

▶30 day delivery on most sizes.

9" columns . . . 3' and 4' arms

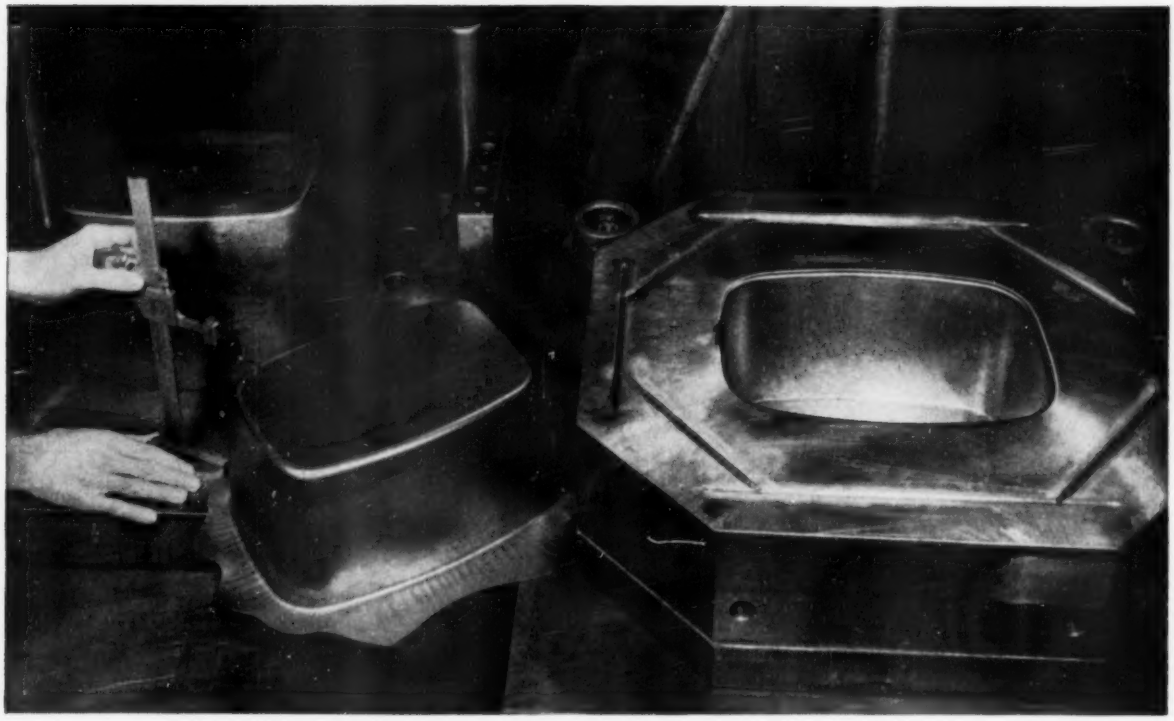
11" columns . . 3', 4', and 5' arms

Fast response to all controls with minimum effort, plus positive "no-drift" clamping, make it easy for Cincinnati Gilbert operators to get more work done accurately and on time. No one detail is responsible: it's the combination of "clean" design and rugged construction that makes Gilberts consistently pay high returns on your investment. 9" and 11" columns. Ask your Gilbert representative to demonstrate why "those who buy Gilbert buy Gilbert again."

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO

Graph-Mo® steel die draws contour shell 5⅞" deep without scoring!



TO keep production up and finishing costs down when deep drawing contour shells for home fryers, the Dickey Grabler Company, Cleveland, Ohio, uses dies made of Graph-Mo®—one of four Timken® graphitic tool steels.

Because of the free graphite in its structure, Graph-Mo has outstanding low-friction properties: minimum tendency to score, seize, scuff or gall. As a result, Graph-Mo dies make the difficult 5⅞" deep contour draw without scoring the stamping. Costly polishing before the chrome-plating operation is eliminated, die life increased.

Graph-Mo offers other die advantages, too. The diamond-hard carbides in Graph-Mo give excellent resistance to wear and abrasion. It responds uniformly to heat-treatment, permitting closer tolerances in the parts. It has good stability, and is easier to machine than ordinary tool steels.

For more helpful information on the four Timken graphitic tool steels and their uses in dies, punches, gages and machine parts, write for the 10th edition of "Timken Graphitic Steel Data Book". The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING